Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI January 28, 1931 No. 9

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Published bi-weekly on Wednesday for producers and manufacturers of Sand, Gravel, Stone, Cement, Lime, Gypsum and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

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Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

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Vol. XXI CHICAGO, JANUARY 28, 1931 No. 9

J. D. Johnson Named Canada Cement Chief

SUCCEEDS A. C. TAGGE, RETIRED

J. D. Johnson, vice-president of the Canada Cement Co., Limited, was elected to the presidency of the company, succeeding A. C. Tagge, who announced his retirement to a meeting of the board of directors held following the annual general meeting of the shareholders at Montreal on January 9. Mr. Tagge will remain as a director of the company.

Mr. Tagge has long been associated with Canada Cement. From 1909 to 1916 he acted as general superintendent, when he became assistant general manager, which position he held until 1927. He was a vice-president of the company from 1921 to 1927. The presidency of the company had been his since 1927.

The board of directors, in accepting Mr. Tagge's resignation as president, expressed some reluctance at losing his services, and also gave expression to a motion of appreciation.

The annual meeting of the shareholders was routine in nature. A total of 409,221 shares of the 600,000 outstanding shares of common stock was represented at the meeting. The board of directors was re-elected, while no provision was made to fill the vacancy created by the death of the late Hon. J. L. Perron.

Takes Honors in Grand Rapids Safety Contest

The Zeeff Sand & Gravel Co. of Grand Rapids, Mich., took first place in the Class A group of plants in the safety contest conducted in 1930 by the Grand Rapids Safety Council.

Harry Zeeff is president of the company. John H. Zeeff is general manager and superintendent of operations.

Milwaukee Organization of Gravel Men Planned

Milwaukee sand and gravel men, including dealers and producers, are attempting to form an organization which will operate under a code of ethics conforming to rules laid down by the Wisconsin state marketing commission.

A meeting at which organization plans were discussed was held January 6 at the Plankinton Hotel. Forty-nine persons attended. Representatives of the marketing commission also were present. A committee, of which Otto W. Lutz is chairman, was appointed to further the plans and to bring in a suggested program at a future meeting.

Two California Plants Merge; Purchase Deposit

The Atlas Rock Co., which for the past several years has been operating on the Stanislaus River east of Oakdale, Cal., will henceforth be known as the Atlas Olympia Co., since its consolidation with the Olympia Sand Co. of Santa Cruz county recently.

The new company, as the first move in its enlarged field of activities, has purchased 77 acres of gravel deposits directly across from the Atlas plant.

The plant, which had been shut down for several weeks, resumed work early this month. The plant has been given a complete overhauling. From eight to 12 carloads have been going from the plant daily, most of which is being used on road jobs and construction work in northern California.

Proposes to Construct Cement Plant at Tulsa

The Mid-Continent Cement Co., incorporated in the state of Delaware, has been authorized to do business in the state of Oklahoma and contemplates the erection of a cement mill at Tulsa. The Missouri Portland Cement Co., St. Louis, Mo., is said to be behind the new company. H. L. Block is president and Hiram Norcross vice-president of the Missouri Portland Cement Co.

Glass Sand Workmen to Give Aid to Unemployed

Employees of the Pennsylvania Glass Sand Corp. have agreed to contribute one day's earnings per month for relief of the unemployed and other distress in the vicinity of Hancock, Md., and Berkeley Springs, W. Va., and the corporation has agreed to contribute an equal amount.

An organization has been completed and a committee appointed to carry on the work during the winter months.

California Executive to Manage Lime Firm

RESIGNS POSITION WITH STATE

R. E. Mittelstaedt, adjutant-general of the state of California, has resigned his position to become managing vice-president of the newly-organized California Lime Products Co. of Sacramento. The company has acquired a 60-acre tract near Sacramento and will soon construct a modern lime plant with special facilities for the recovery of carbon-dioxide to manufacture "dry ice." The new concern is interesting in that it is more interested in the manufacture of the refrigerant and will consider lime more or less of a by-product.

Mr. Mittelstaedt had considerable business experience before he entered the state service. For several years he was associated with the Illinois Pacific Glass Co.

Bayliss Clark, president of the lime products company, expressed pleasure that Mr. Mittelstaedt had accepted the offer to become the company's business director.

He said:

"The state of California is indeed unfortunate in not having at its future disposal the power of organization and accomplishment which General Mittelstaedt possesses, but our company is extremely fortunate in having secured the active participation in its affairs of a man of his initiative and farsightedness. He will bring to us a keen business judgment and high organization efficiency. In his hands our industry is assured a bright and prosperous future."

Sand-Lime Brick Assn. to Convene at Atlanta

The twenty-seventh annual convention of the Sand-Lime Brick Assn. will be held Feb. 3, 4 and 5 at Atlanta, Ga. Convention headquarters will be at the Ansley Hotel.

Present officers of the association are Allen G. Walton, president, Hummelstown, Pa.; A. S. Robertson, vice-president, Toronto, Ont.; Ellen Knight, secretary and assistant treasurer, Saginaw, Mich.; and J. Finkbeiner, treasurer, Detroit, Mich.

Members of the association who plan to attend are urged to make reservations immediately.

Pittsburgh Limestone Erecting New Plant

CAPACITY 1,000 TONS PER HOUR

A new crushed-stone plant, designed to have an ultimate capacity of 1,000 tons per hour, is now under construction by the Pittsburgh Limestone Co. at Annandale, Pa.

According to A. W. Worthington, general manager, the stone will be obtained from the company's underground mine, for the present, at least. The plant is to be electrically-operated throughout, equipment including vibrating screens, washing facilities, dust collectors, and bins for the shipment of ten different sizes of commercial crushed stone, as well as fluxing stone. A gyratory crusher is to be used for primary reduction, while secondary crushing is to be done by rolls.

The Pittsburgh Limestone Co. is a subsidiary of the United States Steel Corp. and, besides its old and new plants at Annandale, has six other crushed-stone operations in Western Pennsylvania and West Virginia.

Forms New Silica Sand Co. in Ottawa District

The Illinois Silica Sand Co. of Ottawa, Ill., was recently incorporated. Everett W. Weaver, Ottawa, is president; Paul Bechtner of Chicago, vice-president, and Mrs. Frances B. Weaver, secretary. The capital stock of the company is $10,000.

The owners of the concern have taken a lease on deposits near Wedron, Ill. The land was formerly held by the American Silica Corp. The new concern has also secured options on other nearby deposits.

Mr. Weaver went to Ottawa about fifteen years ago to become manager of the Higby Canyon Sand Co. He was later manager of the Higby Reynolds Sand Co. and when the American Silica Corp. was formed, he became plant manager of this corporation, holding this position until he resigned several weeks ago.

Mr. Bechtner resided in Ottawa for several years while serving as vice-president of the Higby Canyon Sand Co.

Two Wolverine Cement Plants Being Repaired

Repair crews are busy during the winter shut-down at the Coldwater, Mich., and Quincy, Mich., plants of the Wolverine Portland Cement Co. preparatory to opening the plants for full production early in the spring.

Concrete Products Meet Held at Olympia, Wash.

The sixth annual convention of the Northwest Concrete Products Assn. was held in Olympia, Wash., Jan. 9 to 11, inclusive. Headquarters were in the Olympia Hotel, while the convention sessions took place in the Hotel Governor. Hans Mumm, Jr., of Everett, Wash., president of the association, presided at all sessions. Speakers on the program included W. H. Sharp, American Concrete Pipe Assn.; C. W. Kief, structural engineer, Portland Cement Assn.; E. M. Ambler, chief chemist, Superior Portland Cement Co., Concrete, Wash.; and Bailey Tremple, engineer of tests, Washington state highway department.

Boston Mayor Bans Use of Foreign-Made Cement

Portland-cement manufacturers are encouraged over the recent action of Mayor Curley of Boston in banning the use of Belgian cement by contractors working on city improvements. The mayor's attitude was based on the patriotic ground of the necessity of helping to keep American plants in operation.

For the past three years all domestic cement that has come into Boston has been sold at a loss. Domestic cement companies have continued to ship into this territory, even at a loss, believing that the time would eventually come when an adequate tariff would be passed or that consumers would see the wisdom of supporting American industries.

Fire Destroys Part of California Sand Plant

Fire destroyed the tool house, a warehouse full of supplies and the gasoline storage house and office at the Olympia Sand Co. plant, near Felton, Cal., on January 7. The loss was placed at approximately $3,000 by Herschel McMillan, one of the owners. Adjacent buildings were saved by the prompt action of the Felton volunteer firemen.

The Olympia concern is associated with the Atlas Rock Co. of Stockton, Cal.

Illinois Producer Will Erect $165,000 Plant

The McGrath Sand & Gravel Co. of Lincoln, Ill., has acquired deposits near Mackinaw, Ill., and will soon begin the construction of a new plant to cost in the neighborhood of $165,000. The company now operates five plants in that vicinity.

Michigan State Cement Plant Again Under Fire

Michigan's state-owned cement plant at Chelsea, Mich., storm center of several past legislatures, popped back informally before the body again this month.

Letters signed by William M. Hatch, president of the Peerless Cement Corp., of Detroit, have been sent to each member asking that the Chelsea plant be discontinued and that "this property be disposed of to wipe off as much as possible of the $700,000 deficit charged against the plant."

Ohio Lime and Stone Firm Holds Meeting

NEW GENERAL MANAGER NAMED

At the annual meeting held January 6, of the National Lime & Stone Co., Findlay, O., the following officers were elected:

Joseph Patterson, president; F. R. Patterson, vice-president and general manager; E. C. Edwards, vice-president; C. P. Palmer, vice-president; R. G. Spencer, vice-president; Allen Patterson, treasurer; D. Edwards, assistant treasurer; J. R. Yearwood, secretary and general sales manager.

The directorate remained practically unchanged. Joseph Patterson and Allen Patterson are long known in the Ohio stone industry, having pioneered in early road construction both in Indiana and Ohio in the early nineties, eventually forming The Bluffton Lewisburg Stone Co. with plants at Bluffton, Rimer, Arlington, Findlay and Lewisburg, O. Messrs. Spencer, Palmer and Edwards formerly were associated with The National Lime & Stone Co. of Carey, and also The National Quarries Co. with plants at Bucyrus and Lima, O.

The Bluffton Lewisburg Stone Co., The National Lime & Stone Co., and The National Quarries Co. merged in early 1927 to form the present The National Lime & Stone Co. with general offices in Findlay. This company now operates nine stone plants and two lime plants in Ohio having a potential capacity of 2½ million tons yearly. The lime division manufactures the Monarch brand of lime.

F. R. Patterson, the new general manager, was for many years the operating superintendent of The Bluffton Lewisburg Stone Co. and, after the 1927 merger, became general superintendent of The National Lime & Stone company's operations.

C. G. Knoblauch, with midwest and eastern experience in the stone industry, entered the company's employ in 1927 as construction engineer, supervising the construction of its new and modern lime plant at Carey, O., and later becoming chief engineer. He now assumes the duties of general superintendent.

Standard Gypsum Co. to Make Plant Additions

The Standard Gypsum Co. of Long Beach, Cal., is considering expansion and improvements at its plant, including additional units and installation of equipment to cost over $90,000. Festus T. McDonough is manager of the company.

Paving-Brick Makers to Celebrate Anniversary

The silver anniversary of the National Paving Brick Manufacturers Assn. is to be celebrated at its annual meeting, Feb. 5-6, 1931, at the William Penn Hotel, Pittsburgh, Pa.

Ready-Mixed Concrete a Success in Seattle

REMARKABLE GROWTH IN 5 YEARS

From sales in 1925 that totaled 13,000 cu. yd. to sales in 1930 aggregating 130,000 cu. yd. tells part of the story of success that has been achieved by the Pioneer Sand & Gravel Co. of Seattle, Wash., in the manufacture and marketing of ready-mixed concrete.

"Commercial pre-mixed concrete was virtually an unknown commodity at the time we started," D. L. Williams, vice president and general manager of the Pioneer Sand & Gravel Co., declares, "and much pioneering was necessary.

"The development that this company shouldered in the early days has been a guidance to many other businesses in the northwest and elsewhere. The development of suitable equipment has required financial resources and ingenuity," Mr. Williams reports.

"We have not only kept pace with this rapidly-growing industry, but have probably contributed more to its development than any other institution in the country."

Mr. Williams attributes the phenomenal growth in the demand for ready-mixed concrete, manufactured by his company under the trademarked brand, "Tru-Mix," to conscientious progressive policies instituted at the inception of the commercial pre-mixed-concrete business six years ago.

One of the most encouraging facts in connection with this growth, Mr. Williams adds, is the class of business which has made up the tonnage increase.

Among the important Seattle building projects which have used Tru-mix are the Exchange building, Olympic hotel, the W. Garfield street bridge, Washington Athletic club, Spokane street bridge, Northern Life building, Diamond Cement plant, the University of Washington group of buildings, the federal immigration station, and the Benjamin Franklin hotel.

Concentrates Operations on Sand Plant in Ohio

The Keener Sand & Clay Co., sometime ago dismantled its clay plant at Carbon Hill, O., and concentrated its operation in its sand plant at Shinrock, O., which went into service May 1, 1930. Sand is loaded from the bank by a Speeder Skimmer shovel into cars that are hauled to the mill by a Plymouth 4-ton gasoline locomotive. Included in the equipment for the daily production of 400 tons of foundry sand are a Niagara double-deck screen for removing roots and a Link-Belt Rapp revivifier for aerating and separating the sand grains. This plant has been closed down for the winter.

Cement Company Donates for Harbor Development

The fund which the Bay City, Mich. Chamber of Commerce is raising to pay the city of Bay City interest on the latter's investment of $100,000 with the federal government to expedite improvements to the Saginaw river was enriched by $1,000 recently.

This announcement was made by William H. Reid, manager of the chamber upon receipt of a letter from O. J. Lingemann, general manager of the Aetna-Portland Cement Co. plant in Essexville, Mich. The cement company does considerable shipping by water, and its directors have voted a $1,000 contribution to the chamber's fund.

Start Operating at New Georgia Granite Plant

About 500 persons were present at the ceremonies last month which attended the opening of the new half-million-dollar crushed-granite plant of the Weston & Brooker Co. at Camak, Ga. A huge barbecue was a feature of the opening. The new plant, one of the largest in Georgia, is now producing at the rate of 60 carloads of material per day.

U. S. Gypsum to Acquire Insulating-Board Plant

Negotiations are reported nearing completion whereby the United States Gypsum Co. will take over the Greenville, Miss., plant of the Chicago Mill & Lumber Corp. The Greenville plant was established about two years ago and has been producing insulating board.

Locomotive and cars at the Keener sand operations.

Debate Container-Car Legality at Capital

CEMENT INDUSTRY INTERESTED

Legality of the container car in railroad freight service was debated in oral argument before Interstate Commerce Commission at Washington last week, incident to submission of the case for final decision in the commission's self-instituted inquiry.

A tentative report by a commission examiner sustained the validity of the container-car service under which the carriers move less-than-carload and mixed traffic in detachable steel containers which are loaded on flat cars, but held that applicable rate schedules were prejudicial to other traffic and in violation of the Interstate Commerce Act.

Arguments were opened by Clyde Brown, New York Central counsel, who was followed by H. W. Bickle, of the Pennsylvania, and H. H. Larrimore, of the Missouri Pacific railway's legal staff.

The operation of the container cars, the New York Central counsel stated, has proven very satisfactory and has interesting future possibilities. Movement of bulk freight in container is handled under ordinary tariffs applicable to commodities shipped, he declared, so that rates on this traffic are not involved in the case under discussion. In the use of merchandise containers, however, the New York Central departs from its ordinary class rate schedules. Although these rates may be slightly under the regular applicable class rates, the carriers naturally would not be disposed to charge less than regular rates but apply the regularly established rates wherever possible.

Development of this type of service was originally intended to handle less-than-carload merchandise traffic in order to minimize out-of-pocket losses entailed in handling l.c.l. freight in box cars. He pointed out that there is great waste in handling of l.c.l. tonnage since 25 per cent of all of the box car equipment of all railroads handles only 3.3 per cent of the total traffic carried. Claims on the box car handled traffic for losses and damage amount to a considerable portion of the receipts from this tonnage. Use of the container cars overcomes, to a great extent, the enormous proportion of facilities used to the results obtained.

Instances cited where the container service has been found desirable includes the handling of brick along Hudson River points and thereby secured traffic which heretofore had moved by water. Handling of bulk cement in these steel containers has also attracted a good deal of attention in the cement industry, the New York Central counsel pointed out in his argument.

Editorials

Cement From Abroad

CEMENT prices are down again, this time to meet the competition of imported cement, which is offered at prices below those demanded by American producers in the districts affected by the imports. The reduction in the Maryland district has averaged ten cents a barrel and has been brought about by the desire of some manufacturers to maintain production even at profitless prices. The 23-cents-a-barrel "protection" afforded by the Hawley-Smoot tariff covers only a part of the differential that exists between the prices of American and foreign cement.

The price of cement, like that of the products of all other over-equipped industries, may be expected to show unsteadiness in the face of any threatening competition, whether it be of foreign or domestic origin, and even what is considered adequate government protection will not correct the price-cutting habits of competitive enterprises that find themselves hard pressed to keep overly large plants and organizations fully employed. The wide difference between the prices of imported and American cement arises chiefly from the advantage of cheap labor possessed by foreign mills and partly from low ocean-transportation charges. American industry has been conspicuously successful in reducing labor costs in manufacturing through the development and introduction of labor-saving equipment and it would be strange indeed if American ingenuity could not offset the foreign wage differential by the adoption of superior production methods. American cement producers have barely begun to understand what degree of efficiency and economy may yet be attained in production, distribution and selling.

The Portland-cement industry has little to hope from government aid, and it would accomplish much more toward achieving stability by placing practical checks on over-expansion and over-production, by the exercise of strict self-discipline instead of clinging to the fantastic hope of helpful policing from the outside. Price-cutting to meet the competition of foreign mills will strengthen those who do not resort to it at the same time that it works the financial undoing of those who practice it. In that way it may prove something of a boon, if it helps to place the cement industry on a solid foundation.

The Outlook for Building

GREAT expectations for a phenomenal increase in the production of building materials, on account of the promise of large developments in building this year, are, in our judgment, unwarranted. Although building during 1930 was far below the record year of 1929, there is no valid reason for supposing that the relative inactivity of last year will be compensated for by correspondingly greater activity this year. Reliable information available several years ago indicated that the country was suffering from a marked surplus of housing accommodations of all kinds—public and private, industrial and residential—and this condition, far from being bettered by the feverish building activity that followed, was indeed aggravated by the too ready willingness of some men to borrow and of others to lend.

As a result it may be many months, and even a year or two, before building will reach what may be called a normal pace. An unrentable surplus exists in practically every populous center of the country and in practically every type of built-for-profit structure. The conditions among apartment buildings, commercial and residential hotels, and office buildings are notorious, and, with many of such properties defaulting in their interest and principal payments, it is difficult to conceive of new enterprises finding ready money except where they are clearly justified by local conditions. As many manufacturers are over-equipped in plant capacity, no general program of huge plant extension can be looked for, although, here, as in all forms of building activity, exceptional conditions may justify some large individual developments. In private dwellings there is a notable shortage in some classes and a slight surplus in others, while among low- and moderate-priced apartments there is in most large cities a deficiency, due, however, to a general unwillingness to reduce rentals to proper levels rather than to a scarcity of buildings. As long as political life thrives on the diversion and private utilization of public funds the erection of public buildings may be expected to develop even faster than the growth of population and the still more rapid increase in the number of political jobholders.

In spite of the caution that will and should prevail among builders and those who finance them, building activities this year should certainly not be less than in 1930 and may even be eight to eleven per cent better. According to reliable information, recorded building construction in twenty classes of buildings in 1930 amounted to about $2,500,000,000, and to this sum there should be added between $350,000,000 and $400,000,000 for construction not recorded, making a total of $2,900,000,000 at the most. In view of reasonably certain increases in the amount of building for various industrial, residential and public purposes and making conservative allowances for equally certain decreases in building for other purposes, it seems fair to assume that 1931 building in the same classes may reach a total of approximately $3,200,000,000. To this amount emergency building programs of national, state, county and municipal governments

may add $500,000,000 or $600,000,000, and miscellaneous activities may provide $700,000,000 or $800,000,000 more.

Under the most favorable outlook that can be justified by a knowledge of conditions $4,600,000,000 would seem to be the maximum that can be confidently expected in all kinds of building activity this year. If that figure should be reached, neither producers, material dealers, nor contractors will have cause for any feeling other than satisfaction. In ordinary times an increase of five per cent over the preceding year is more than sufficient to support industry on a profitable basis and to insure an advancing standard of living, so that a growth of ten per cent should afford a very encouraging outlook for non-metallic mineral producers and their customers.

Judging Business by Trends

FEW business men, aside from public-utility operators, attempt to look more than twelve months ahead, and fewer, except actuarians, look any farther back. Yesterday, to-day and to-morrow mark the pitifully small field of interest of the average man. For this reason the business done in any week, month or year is always compared with that of the week, month or year just past, and if the comparison reveals an increase, business is said to be good; if a decrease, bad. According as such a comparison shows "good" or "bad," are business men optimistic or pessimistic, and to the same extent are their activities enlarged or curtailed. So that the calendar is, in reality, setting the pace for business development; its arbitrarily fixed divisions are the measures by which business growth is judged.

There was no reason why the business in non-metallic minerals during 1930 should have been better than in 1929, and there were many reasons why it should have been and was worse. There was no reason for having expected it to be better, yet where is the producer who did not cherish that very expectation and who did not lament the fact that his hope was not realized? There was every reason for having expected business to be worse, yet where is the business man who saw such a reason or acted upon it? The practice of expecting each year's business to exceed that of the preceding year is a dangerous habit, for it raises expectations that can not always be realized, and the disappointment that follows expectations unfulfilled has a depressing effect on men's confidence in the future.

Business in our industries in 1931 need not be better—if by better is meant bigger—than in 1930 to support them on a profitable basis. It is a very common experience to find the volume of business shrinking and the profits derived from it mounting, just as it is not unusual to find the volume of business increasing and the profits it pays decreasing. As long as men's aims are measured by sales rather than profits, just so long will business show greater changes in volume than in profits. If 1931 returns as much profit as 1930 gave—and there are more reasons for expecting that result than its opposite—the non-metallic mineral industries will have no cause for complaint, not even those men who insist on judging 1931 by 1930.

But why should one year's business be compared with another's, since the years—the units by which business is measured—are not uniform. No two days, weeks, months, or years are alike, so how is it possible to make an intelligent reckoning of the growth of business by using measures that are forever changing? There can be no comparison without a standard of comparison; and no measure of shifting value can be a standard. It has been suggested—in all seriousness, let it be understood—that, instead of amending the calendar, we should discard it; that it is actually more of a nuisance than a help, and that business would really be much better if men could forget to measure progress by weeks, months, and years.

While we may be far from adopting any such rash expedient, we may still not be above the use of methods that will mitigate the evils which follow working by the calendar. If producers could be induced to abandon the year as a basis for business comparisons and adopt some other term, which would more nearly equate the seasonal and other inequalities that recur at regular intervals in the twelve-month period, their attitude toward business growth would be brightened and their realizations would more nearly approach their expectations. Or, if this is asking too much and they insist on retaining the traditional year, let them at least make their comparisons over long periods of time; let this year's business be compared with the average of the preceding five, ten, or fifteen years, or the number of years in which they have been in business. If their business-profit curves, plotted over many years and properly adjusted for correctible inequalities, show a rising tendency, they will have no reason for anxiety.

It seems hard to realize that growth is not synonymous with continuous—that is to say, uninterrupted—expansion. We look too intently at the minor ups and downs that are visible in our business curves and not enough at the general trends. We do not realize that business evolution, like the evolution of other forms of activity, is the result of natural causes, and that nature makes millions of mistakes in her progress upward toward perfection. Countless millions of individuals are discarded in the struggle for existence before a superior form becomes established; many losses are needed to achieve a single gain. Every change need not be for the better, if the general trend be forward. Every year's business need not be greater, if the long-pull trend be upward.

Prosperity and hard times reflect their mental causes—elation and depression. The mind that takes the long-pull view of things need never be depressed, and the business that builds for long-time gains will not be insecure.

Enthusiasm Rampant as Crushed-Stone Producers Convene at St. Louis

A. L. Worthen, Connecticut Quarries, Inc., Official, Named President for 1931 Term

PROBABLY the greatest test of the strength and importance of a trade association is in the success of its national convention held during a period of adverse business conditions. The unusually large number of delegates at the annual convention of the National Crushed Stone Assn. at St. Louis, Mo., Jan. 19, to 22, 1931, and their optimistic cheerfulness, demonstrated that this industry has made progress during the past year and that its national association will continue to receive the interest and support of its members.

With an attendance of 601 at the close of the third day of registration, every important center of production was represented. Large delegations from Texas, the New England states and the Northern states showed that not even long distances could deter men eager to take part in the most important gathering of the industry in St. Louis.

In line with present business conditions, the convention program was designed to present the best thought on the major problems of the day. Speakers of national repute were obtained: their analyses and constructive advice will pave the way for the improvement of the industry. Such men as Thos. S. Holden, vice-president of the F. W. Dodge Corp.; Dr. H. S. Hulbert, noted Chicago psychiatrist; Dr. Wm. B. Guitteau, Collector of Internal Revenue in the Toledo district; Harold Williams, prominent Boston attorney; and Joseph T. Robinson, U. S. senator from Arkansas, addressed the delegates in one of the most interesting programs the association has ever had. The program committee certainly is to be commended on its excellent work.

A. L. Worthen.

In his address at the opening of the convention, W. F. Wise, president of the association, expressed his confidence in the future of the industry, pointing out that it will be one of the first to recover from the depression. Many valuable lessons have been learned during this period, he said in substance, and all signs point toward a better understanding and coöperation between all industries, the state, and federal governments. The associations of several allied industries, the National Sand & Gravel Association, and the National Slag Association, have much in common with the National Crushed Stone Association, he declared, and many common problems can be solved by joint committees. Much good has already been done along these lines, and it is hoped that more can be accomplished in the future.

President Wise recommended the extension of the association's research activities, and commended the large amount of work done under Mr. Goldbeck's direction. He suggested that $10,000 be added to the research budget to enable additional assistance to be given Mr. Goldbeck in his work, the money to be raised by personal subscription of the members who would directly benefit. In the matter of convention committees, the chair appointed E. J. Krause, of the St. Louis Quarrymen's Association, as chairman of the Entertainment Committee; Mrs. E. J. Krause, chairman of the Ladies' Entertainment Committee, and Col. E. J. McMahon, chairman of the Reception Committee. More will be said later of the fine work of these appointees.

Mr. Wise was most happy in informing the convention that the Manufacturers' Division of the association had reached the max-

More than five hundred members and guests enjoyed the annual banquet.

imum number of memberships allowable under the constitution—100—and that there are several names on the waiting list. This, he felt, was a most encouraging indication of the support of the manufacturers' group and he considered it distinctly complimentary to the importance of the association.

The complete list of new officers and directors follows:

President: A. L. Worthen, Connecticut Quarries Co., Inc., New Haven, Conn.

Regional Vice-Presidents: C. M. Doolittle (Canadian), Hamilton, Ont., Canada; A. J. Wilson (Western), Watsonville, Cal.; E. Eikel (Southwestern), New Braunfels, Tex.; A. S. Lane (Eastern), Meriden, Conn.; H. E. Bair (Central), Toledo, O.; W. R. Sanborn (Northern), Kankakee, Ill.; T. I. Weston (Southern), Columbia, S. C.; Porter W. Yett (Northwestern), Portland, Ore.

Board of Directors: Max A. Altgelt, New Braunfels, Tex.; W. M. Andrews, Youngstown, O.; H. E. Bair, Toledo, O.; H. E. Billman, St. Louis, Mo.; A. J. Blair, Milwaukee, Wis.; L. J. Boxley, Roanoke, Va.; C. D. Brewer, Duluth, Minn.; L. R. Cartwright, Indianapolis, Ind.; O. P. Chamberlain, Chicago, Ill.; J. E. Cushing, Schenectady, N. Y.; C. M. Doolittle, Hamilton, Ont., Canada; F. O. Earnshaw, Youngstown, O.; E. Eikel, New Braunfels, Tex.; Otho M. Graves, Easton, Pa.; F. T. Gucker, Norristown, Pa.; J. L. Heimlich, LeRoy, N. Y.; W. E. Hilliard, New Haven, Conn.; W. P. Hodgkins, Chicago, Ill.; E. J. Krause, St. Louis, Mo.; A. S. Lane, Meriden, Conn.; Thos. McCroskey, Knoxville, Tenn.; B. A. McKinney, West Roxbury, Mass.; F. R. Patterson, Findlay, O.; John Prince, Kansas City, Mo.; Russell Rarey, Columbus, O.; John Rice, Easton, Pa.; J. A. Rigg, Alderson, W. Va.; H. E. Rodes, Nashville, Tenn.; W. R. Sanborn, Kankakee, Ill.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; J. F. Schroeder, Davenport, Ia.; H. M. Sharp, Toledo, O.; W. L. Sporborg, Syracuse, N. Y.; J. W. Stull, Rocky Point, Va.; Mortimer Wandell, New York, N. Y.; T. I. Weston, Columbia, S. C.; G. J. Whelan, Cleveland, O.; A. J. Wilson, Watsonville, Cal.; A. L. Worthen, New Haven, Conn.; W. F. Wise, Dallas, Tex.; Porter W. Yett, Portland, Ore.

Representing the Manufacturers' Division on the Board of Directors: Bruce Shotton, chairman, Hendrick Mfg. Co.; H. M. Davison, Harnischfeger Co.; Max S. Lambert, Robins Conveying Belt Co.

One of the outstanding features of the convention was the superb entertainment provided by the St. Louis Quarrymen's Association. For originality, and genuine mirth-provoking fun, it is hard to conceive of a better program. Beginning with a reception for the board of directors and visiting delegates on Sunday, Jan. 18, the entertainment continued at a rapid-fire pace, with a one-ring circus on Tuesday night, called "St. Louis Night," the annual banquet on Wednesday night, and last, but not least, a special stag frolic for the superintendents on Tuesday night.

The ladies' program included a reception and tea, a card party, a most interesting sight-seeing trip, and several luncheons. Credit for this outstanding feature of the convention is due largely to E. J. Krause and Mrs. Krause who headed the two entertainment committees, and to the St. Louis Quarrymen's Association. The "St. Louis Night," a one-ring circus frolic, contained a bill of 23 acts, many of which were of national theatrical renown, including several from the Ringling Bros. circus. "Silvertone," co-star of "Whoopee," Mary Margaret Noble, prima donna of "Fire Fly" and the "Whirlers,"

E. J. Krause and H. M. Davison.

Roy Watson and J. R. Boyd.

sensational skaters, were some of the star performers who delighted the audience. Following the circus, dancing completed the evening's entertainment. "St. Louis Night," incidentally, was made possible by the St. Louis district producers and the powder manufacturers in appreciation of the convention's coming to St. Louis.

The superintendents' entertainment, held only for this group at the Missouri Hotel, proved a memorable affair. Prospective convention cities and entertainment committees will have a real target at which to shoot.

The convention opened its first session with a silent tribute to the members who have died during the past year. President Wise then introduced Guy Wood, who, as a representative of Victor Miller, mayor of St. Louis, welcomed the delegates to the city. Mr. Wood spoke of the interesting and historical features of St. Louis, and told of the $87,000,000 bond issue which will be used to improve the city. The delegates were gratified to learn that during the administration of Mayor Miller, crushed stone had been given equality in city specifications with other materials.

After the presidential address, the members of the Board of Directors gave their report of business conditions during 1930, and their outlook for 1931. These reports, coming from every production center in the country, gave a cross section of this subject. Some of the reports were most optimistic, others again were not. Taken as a whole, the sentiment expressed confidence for the ensuing year, with a definite indication of a trend forward to normal times. All of the directors agreed that the experience gained during the past year was most profitable, resulting in greater economies of operation and production.

W. M. Andrews

It was interesting to note that business conditions in so many parts of the country were satisfactory.

W. W. Boxley of Roanoke, Va., felt that his company had a very satisfactory year. He anticipated an increase in the Virginia state program for road construction as well as an increase in his local road and street construction. He did not anticipate, however, any improvement in the railroad-ballast business.

C. D. Brewer of Duluth, Minn., expressed his confidence for 1931 in his anticipation of at least as great a volume of business as he had in 1930. Grain-elevator construction should demand a large volume of material in the wheat belt, he stated.

L. R. Cartwright, Indianapolis, Ind., suggested in his report the adoption of a uniform system of cost accounting, declaring that the resultant benefit will be reflected in a better standard of selling prices.

Col. O. P. Chamberlain, Chicago, Ill., told of the tremendous drop in building construction in the Chicago area, stating that the 1930 volume fell off 80 per cent from the 1926 volume. Prices were lower during the last year than in any year since 1920, he said. Col. Chamberlain, in spite of the appalling condition in his territory, felt hopeful for a better year in 1931.

C. M. Doolittle of Hamilton, Ontario (Canada), in his report, which was read by A. T. Goldbeck, declared that his organization was not discouraged and that 1931 promises well. The Canadian quarries had a good year, he wrote.

Reports from the directors in the eastern sections of the country agreed that the railroad-ballast business would be a doubtful quantity during the coming season.

F. O. Earnshaw of Youngstown, Ohio, reported

that the flux stone business in the Pittsburgh, Ohio, and West Virginia districts had fallen off considerably during the past year and that, from present indications, it should be better during the ensuing year. He felt that prices appear to be more stabilized in his district.

John Rice, Easton, Pa., claimed that the 1930 volume of business compared favorably with that of 1929. The increased road construction promised for 1931 should offset the reduced railroad-ballast business, he said. Mr. Rice anticipates a good year.

Probably the best expression offered by any of the directors for the present conditions was offered by Col. E. J. McMahon of the St. Louis Quarrymen's Association, who quoted Will Rogers—"Business is lying flat on its back—but looking upward!"

The Committee on Finance of which A. L. Worthen was chairman gave its annual report following the appointment of the convention committees. Mr. Worthen reported that an increase in revenue had resulted since the adoption of the sliding-scale system of dues-payment, despite a bad business year. Under the new system, 63 members paid a greater amount during the past year, than in the previous year, while 18 paid less. Considering that 23 members resigned during the same period, the fact that the association enjoyed an estimated increase in its net income of $9,041 is all the more commendable. Mr. Worthen suggested that all of the members contribute an amount this year at least as great as that of last year.

The Monday afternoon session, presided by Arthur S. Lane, of John S. Lane & Son, Inc., Meriden, Conn., was crowded with a fine program of papers. Three prominent authorities on the bituminous type of pavement brought the latest thought to the members on this subject. The subjects of "Some Legal Aspects Proration" and "Taxation and Transportation" were also taken up in the program.

"Proration is the cure for overproduction," said Harold Williams, member of the Boston Bar and for some years an annual speaker at the association's convention. Proration, as Mr. Williams explained, is the voluntary reduction in the production of a natural resource or raw material in an effort to curb overproduction with its attendant evils of deflated market conditions. He told of the

J. A. Rigg

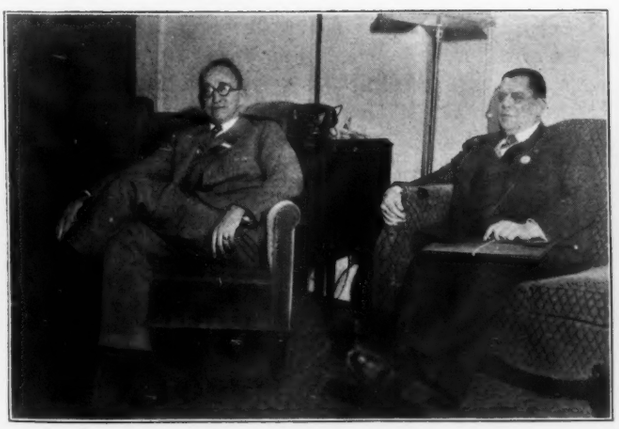
efforts made in the crude-oil industry to curb the overproduction of crude oil and to discontinue the wastefulness so characteristic of this industry. In 1924, President Coolidge created the Oil Conservation Board. This board, despite the Sherman Anti-Trust law, working on the theory of the conservation of a natural resource, has brought about a tremendous improvement in the oil industry, Mr. Williams said.

The question whether proration is legal, and whether it can be applied to the crushed-stone industry is of great interest at this time. According to Mr. Williams the legal aspect of the subject can be divided into two topics:

1. How far can a state limit production on the theory of the Conservation of Natural Resources, and still be within the constitution.
2. How far is it legal for associations and business groups to make agreements for the conservation of raw materials without violating the anti-trust laws.

In discussing the two topics of the subject, Mr. Williams pointed out that preservation is a legitimate matter according to the Supreme Court of Oklahoma. Federal courts have not, however, ruled on this decision, he said. Mr. Williams also pointed out that in any business it might be difficult to establish the fact that overproduction exists, and that it may be unsafe to consider proration in this type of business as conservation.

In closing his paper, he recommended that an in-



Former President W. F. Wise and Col. O. P. Chamberlain.

E. G. Lewis, Otho M. Graves, and A. L. Worthen.

Left to right—A. B. Rodes, E. J. McMahon, H. E. Rodes, James Savage and W. E. Hilliard.

quiry be directed to determine whether, in spite of the anti-trust laws, an industry should be entitled to take measures to limit its production to prevent its prices from reaching a level bordering on disaster.

The bituminous-pavement program was opened by B. E. Gray, highway engineer, The Asphalt Institute, New York, N. Y., who spoke on "The Economic Features of the Bituminous Type of Road." Mr. Gray reviewed the fact that the primary object of transportation is to carry the movement of facilities. He said that it is self-evident that insufficient progress has been made in the furnishing of roads to meet the demands of present-day transportation. The public does not care what a road is made of, as long as the road is smooth, dry and convenient, he declared. Mr. Gray decried the lack of continuity in our present road systems, and the fact that our secondary road systems have been so neglected. A highway system which does not serve all, is not doing its job, he said.

In discussing the economic features of the bituminous type of pavement, Mr. Gray stated that, at a cost of $5,000 per mile, a bituminous pavement can be built with adequate thickness for the worst conditions, through the use of proper methods. Through the study of subgrade conditions, drainage and allied problems, a suitable type of bituminous pavement can be designed utilizing varying thicknesses resulting in a most economical type of road. In some instances, a 2-in. surface treatment will convert an earth road to a satisfactory type of pavement. Mr. Gray told his audience, when the conditions as determined from a study of them are right, a large percentage of our 3,000,000 miles of roads can be satisfactorily treated with low-cost surfacing.

The construction of light-surface pavements will not reduce the crushed-stone demand, Mr. Gray said, but would rather tend to boost it, because their economy would permit the available funds to pave a greater amount.

The discussion of Mr. Gray's paper was led by C. L. McKesson, director of engineering and research, American Bitumuls Co., San Francisco, Cal. Mr. McKesson presented many statistical facts concerning the number of automobiles in operation at the present time in this country, and the available paved roads. He pointed out the fact that the type of road constructed should be determined by a study of the number of vehicles using it, and other traffic conditions that enter into the problem. The number of vehicles per day using a particular road will present a basis upon which to calculate the revenue per mile received through gas taxes, license taxes and other sources. The annual revenue per mile as compared with the cost of construction and maintenance will determine definitely whether a standard pavement

Arthur S. Lane

(concrete inferred) will be profitable, or whether a bituminous pavement will be the most economical. It is readily seen that a road with a light volume of traffic would not justify the use of an expensive type of pavement, when analyzed in this manner, Mr. McKesson claimed.

Mr. McKesson concluded his discussion with an explanation of the costs and types of bituminous pavements used in and about San Francisco. He also showed a number of slides illustrating these pavements.

Geo. E. Martin, consulting engineer, The Barrett Co., New York, N. Y., reviewed the preceding papers on the bituminous-pavement subject, and repeated Mr. Gray's words, "the time for isolated small sections is past" and "the public is no longer satisfied with a few good highways and impassable rural roads." Mr. Gray pointed out that the highway engineers are now abreast with the tremendous demands for through-state trunk highways, and that they will have more time to consider the development of the secondary systems. He urged that this is the opportune time for the men of the crushed-stone industry, machinery manufacturers, and bituminous-materials companies to pull together to realize on the improvement of the highway systems which is bound to come at this time.

Dr. Wm. B. Guitteau, Collector of Internal Revenue, Tenth District of Ohio, Toledo, and former executive secretary of the Ohio Crushed Stone Asso-

ciation, spoke on the subject of "Taxation and Transportation." In his paper, he reviewed the early history of our highways, and showed their importance in the development of our nation. In the construction of highways, Dr. Guitteau explained the method of financing through taxation. He pointed out particularly that, since the latter part of the 18th century, the principle of "the user should pay for the roads" has been in effect. He said "We cannot justify the taxation of the farmer for the construction of city streets, nor can we justify the taxation of city property for the improvement of rural roads. Dr. Guitteau claims that often too expensive types of pavement are built without justification, and that many of them are not at all necessary. He decried the fact that, many times, a new highway has been built without any attempt to make use of the existing pavement. Conservation of the investment in public roads and the curtailment of wastefulness in their construction should be the principles upon which highway construction should be based, he declared.

An informal group at luncheon. Left to right—H. N. Lendall, Otho M. Graves, Mrs. F. D. Norton, Capt. F. D. Norton, and Roy Watson.

Dr. Guitteau then reviewed the expenditures of our government and compared them with our national income. At present $45,000,000 per day is spent by our governments for transportation purposes, and the increased demands indicate a further increase in our taxation rates. He indicated that, unless extravagance and wastefulness were checked, the rate would soon reach 20 per cent our national income—an almost impossible condition.

Tuesday's program contained a number of interesting topics. Late in the morning session the subject of "How to Win an Argument" appeared on the program, to be delivered by two professors from New York University. No one in the audience anticipated what was in store for him, and these professors swept the meeting by storm in what was probably the most interesting, instructive and entertaining topic on the convention program.

Professors Alvin C. Busse and E. E. Nyberg, outlined for the delegates the right and the wrong principles of salesmanship. Prof. Busse reviewed first the well-known principle that it is better to win a sales talk, make the sale and hold the good will of the customer than to win the argument and lose the sale. He related his first experiences back in his college days, as a book salesman trying to earn his way back to classes. With an actual demonstration much to the delight of his audience, Prof. Busse went through the steps of a sales talk to a housewife. These steps, he had been told by his sales-manager, were sure to win at least six book sales a day. Without going into their details, it can be said that they consisted of getting into the lady's house and winning her sentiment through an appealing picture in the book. These several steps depended on one another. If one failed—well "let's try the lady next door." This old type of salesmanship is passing into oblivion, and salesmanship is now based upon sound principles of business argument. These principles, which the professor then stated, were the summary of over 7½ years of study and investigation. The two professors actually spent months in the purchasing agents' offices of some of New York's greatest business institutions, trying to analyze the failure of some salesmen and the outstanding success of others. This study, and its vast amount of data, coupled with their own actual experience, led them to the conclusion that the principles of a good business argument were so appallingly simple that the average man violates them without realizing it. The professors stated that the practical application of their six principles has resulted, in every case among several large business firms, in increased business and more successful individual salesmen.

Professor Busse presented the following principles, in substance:

1. During the course of a business argument, don't talk too much yourself: your prospect wants to talk too.

Discussing this point, the professor said that a

B. A. McKinney

prospect stops listening intelligently when he has no opportunity to voice his own opinion or objection. This objection turns over in his mind, puffs up and inflates itself to a point of exaggeration. Soon the inevitable happens, he becomes irritated—and the argument is lost. Be a gold talker—but be a good listener first, Professor Busse advised.

2. During the course of a business argument, be careful not to interrupt your prospect in the course of his objection.

To this was added the comment, that "Whoa, now let me tell you something right here!" will be sure to irritate your prospect.

3. During the course of a business argument, don't slip into belligerent or over-positive argument.

These three principles are simple, yet it was Confucius who said, "Men don't trip on mountains, they trip on mole-hills."

To demonstrate the first three principles of the business argument, the two professors engaged in a dialogue between two congressmen—both discussing the farm situation. "Congressman" Busse attempted to persuade "Congressman" Nyberg to see the problem in his way but, in so doing, he violated every one of the first three principles, irritating Congressman Nyberg to the point of sheer distraction, thereby losing the argument entirely. Needless to say, the Congressmen put the dialogue over, sending the audience into rollicking laughter.

The last three principles can be summarized as follows:

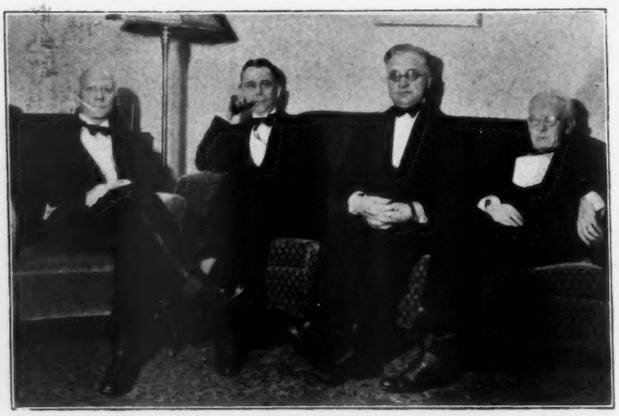
4. During the course of a business argument, inquire first, and attack afterward.

In so doing, the prospect disarms himself and gives away his alternative of objection, leaving an ideal entrance for your argument.

5. During the course of a business argument, be sure, every time that the prospect states an objection, to restate the objection in your own words.

The salesmen thus eliminates the necessity for the prospect to restate the objection if misunderstood, without waiting through a long argument which is sure to irritate him.

6. When you overcome the principal objection, drive your convincing answer home.



Left to right—H. N. Lendall, Otho M. Graves, H. E. Bair, and John Rice.

Or, to quote Congressman Busse, "nail it to the board."

The two professors then demonstrated these principles through further dialogue and, in closing, Prof. Busse declared that, after all, a knowledge of your product and your own market conditions are probably most important in successful salesmanship for, without this knowledge, no amount of effort can be convincing or productive.

Needless to say, the convention applauded the two experts almost endlessly.

S. W. Freese, of the firm of Hawley, Freese and Nichols, consulting engineers of Fort Worth, Tex., read a paper entitled "The Applicability of Various Methods for Sewage Disposal." In it he described the trickling-filter and activated-sludge methods of sewage disposal, comparing the costs and principal features and objections to both methods. This topic is of interest to the crushed-stone industry, because of the large amount of crushed stone used in the trickling-filter method. Summarizing the two types, Mr. Freeze stated that the trickling-filter method has a high initial cost, requires at least a head of 15 ft. for the incoming sewage, and is suitable only the communities of less than 20,000 people. The operating cost is low, and it is most suitable under conditions of high power costs, and available reasonable-cost crushed stone. The activated sludge method, according to Mr. Freese, is suitable for communities larger than 20,000 people and where the power costs are relatively low, at least less than 1 cent per kilowatt-hour. Because of its high operating cost, it is not economical for small cities. Objectionable odors, however, are not produced by the latter method, he said, whereas, in the trickling-filter method, this condition is likely to be present and is difficult to control except through expensive housing, necessitating the removal of the plant to at least a mile from the city.

John Prince

For determining the type of plant required for a given community, Mr. Freese suggested a detailed study along these lines:

1. Choice of plant by an economic comparison of

the cost of power and the cost of crushed stone.

2. Cost of operation.
3. Consideration of the odor factor.
4. Means of sludge disposal.
5. Consideration of the community development.

Harry N. Lendall, professor of civil engineering, Rutgers University, discussed the paper of Mr. Freeze and pointed out that the topic should be referred to as sewage treatment rather than sewage disposal or purification, as the various methods differ in the amount of removal of harmful organisms. He added that the primary consideration in the design and selection of a plant is the degree

J. F. Schroeder, W. R. Sanborn and F. O. Earnshaw.

of treatment required, based on: volume of flow of the stream receiving the effluent, possible use of the stream as drinking water, protection required for shell fish, recreational use of stream, and state laws and their requirements.

Certain states, Prof. Lendall said, require sand filters, as in New Jersey, where secondary sedimentation is through sand-filter beds. The principal objection to the trickling-filter method is the odor annoyance and the filter-fly pests which seem to swarm about this type of plant. No disinfectant has been found, as yet, to rid these pests, he said.

The activated-sludge method is comparatively new, the first large plant having been built in Milwaukee, Wis., Prof. Lendall continued. With the introduction of new mechanical equipment, much of the early difficulties have been eliminated and, at present, communities of 3,500 persons and upward are rapidly adopting this method. With the trend toward better methods of digestion, heat-treatment to reduce the time required for digestion, improvement of aeration methods, the end of the trickling-filter method is not far off, and it will probably disappear in ten years, he stated.

The activated-sludge method can be applied to nearby towns in the form of a joint plant, thereby reducing the cost and providing for increased development of the communities.

With the disappearance of the trickling-filter plant, the market for crushed stone will not collapse, according to the professor, but, instead, through the increase in the number of plants, the

W. H. Margraf, N. G. Farber and J. R. Bent.

market will be as great or greater because large amounts of concrete are required in this construction.

In the general discussion which followed, Mr. Freese pointed out that crushed stone is preferable to gravel for the trickling-filter beds, because of the larger surface area of the material. Possibilities for the use of concrete pipe were also discussed, and the members learned that this type of pipe is preferable to vitrified tile, especially in sizes about 24 in.

"Rates and Rate Making" was then taken up by Edwin C. Brooker commerce counsel, Washington, D. C. He stressed the importance of the subject to the producers, and discussed the fundamental factors which enter in the making of rates. He said that the nature and value of a commodity as it affects the carrier and its risk, loss or damage susceptibility, average loading volume, and the like, were the fundamental factors, and that, in every case, crushed stone and its allied products were the most desirable types of traffic.

Rates are now on a uniform basis, tending toward the use of maximum mileage scales. Several court decisions, notably the Penn scale, the West Bend scale, and others, are still the basis of rate determinations in their respective territories.

Comparing the loading volume of crushed stone, and the number of cars required for a given locomotive size, as against the loading volume of ordinary freight and its increased number of cars required for the same size locomotive, Mr. Brooker felt crushed-stone shippers are required to pay more than their just share in proportion to other industries. He said that shippers owe it to one another to protect their interests and to see that no precedent is set injurious to others.

"What is the Construction Outlook," a paper by Thomas S. Holden, vice-president of the F. W. Dodge Corp. of New York, N. Y., was of great interest to the convention. He pointed out the lessons of the 1930 business experience and analyzed the abuse of credit during the period preceding the depression. In 1929, the building industry had over-anticipated its requirements by a full year. In 1928, the residence building already began its readjustment, preceding the commercial building

Bruce G. Shotton

by nearly a year, as it usually does, he said. Residence building struck bottom last year and will be the first to recover, although there is no warrant to anticipate another boom period. Commercial and industrial building will follow only after a 1931 period of readjustment and absorption of surplus requirements, he claimed. Public utilities will continue to enlarge to meet increased demands, although their 1931 volume will probably be less. Highway construction will continue to expand, he pointed out, and engineering and small projects will probably take the lead this year. He anticipates a liquidation of the surplus in the industrial and commercial building field.

Tuesday's afternoon program was divided into two branches, a meeting of cost accounts, and a sales-problem conference. A luncheon preceded both meetings. P. B. Reinhold of Reinhold & Co., Pittsburgh, Pa., presided over the latter session.

Robert J. Kratky, attorney-at-law of St. Louis, Mo., opened the sales meeting with a paper entitled "Popularizing an Industry." He repeated the well-known statement that it is one thing to produce a commodity, but another to sell it. He appreciated that the industry has striven to improve itself from within, but the public, as the ultimate consumer of crushed-stone products, knows almost nothing about it. Like other industries, the crushed-stone industry has not realized that the public must be educated to further its sales. Why wait until the home owner builds, or until the city builds its streets before attempting to sell your product? asked Mr. Kratky. After all, the members of the board of directors or the common council are men and, as members of the general public, get what they want. Citing the Coca-Cola company, he said that this firm does not wait until the public gets thirsty to sell its product but rather suggests that "When you are thirsty—drink Coca-Cola."

Mr. Kratky urges the dramatization of the industry. The result will be found in the prospective home-builder going to the architect and demanding the use of crushed stone and stone products wherever possible.

E. T. Nettleton, sales manager of the Connecticut Quarries Co., Inc., New Haven, Conn., read his paper on "Development and Carrying Out of a Sales Program Through Central-Office Control." Mr. Nettleton, whose company owns six quarries and four distributing stations, told of the methods of advertising and the methods used in arranging salesmen's calls. The sales manager has direct control over advertising, sales, testing of materials, freight rates, investigation of new specifications, establishment of dealers, and the determination of screen sizes for the marketing of the most desirable and economical sizes. Besides advertising in the commercial magazines, several motion-picture reels have been taken to be shown before local service clubs and the like. These pictures are of an educational nature and do much to promote the sale of crushed stone, Mr. Nettleton said. Another advertising scheme employed by the Connecticut Quarries Co., is the mailing of blotters to a list of 2,500 names of prospective users.

Regarding their sales methods, Mr. Nettleton outlined the duties assigned to the men, who act also as paymasters, in order to keep them in contact with the plants and the methods used in the production of their products. All salesmen are on a salary basis, and are required to collect accounts when necessary. Each Saturday morning, the men report for a conference with the sales manager to discuss the week's work. Three days of the week are devoted to calling on current special leads, and two days on a special calling list, whose names are largely obtained from the results of the blotter mailing system. All customers and prospects are card-indexed according to the number of calls necessary to develop and continue their business. Salesmen's routes are arranged from these cards and with the aid of a territory map.

In the discussion which followed, the question of cash discount arose. It was the general opinion that a discount is one more avenue for price cutting. According to William E. Hilliard, who has had long experience in matters of credit, the practice of allowing cash discounts is waning. Because equipment dealers and manufacturers no longer allow it, 85 per cent of the producers' bills are net 30 days. Mr. Nettleton admitted that his company had successfully done business without the cash

Max S. Lambert

discount, and that it had no thought of abandoning its stand on the subject.

A paper entitled, "The Management of Credit in the Stone Industry" was read by William E. Hilliard, general manager of The New Haven Trap Rock Co., New Haven, Conn. He outlined the extreme importance of credit in modern business, defining it as the power to obtain by giving in exchange a promise to pay at some future time. He subdivided the various types of credit and discussed on what requirements it could be given. The three C's of credit requirements—character, capacity, and capital—were discussed and their importance demonstrated. He told of the original rating companies —R. G. Dun & Co. and Bradstreet—and the work of the National Assn. of Credit Men. He urged the members to make use of the local bureaus operated by credit men, chambers of commerce and banks, telling them of their value and of the benefit gained.

Col. E. J. McMahon, executive-secretary of the

Retiring President W. F. Wise and K. H. Hanger, engineer, maintenance of way, M. K. & T. Ry.

St. Louis Quarrymen's Assn., discussed "What Can a Local Trade Association Do to Ethically Promote Sales." He told of the value of advertising, stating that experience has proved that direct-mail advertising has produced the best results. By the use of 24 postcards in series, at an original cost of only $900, sufficient momentum was created to permit the reduction of the expenditure $550 and, later, to $450 per year. In spite of a reduction of 40 per cent in building permits, the association members increased their sales 10 per cent through the method of advertising.

Other services of the St. Louis association were in the simplification of specification requirements. There were formerly 94 grading specifications by the various township, county and state highway boards within 25 miles of St. Louis, the colonel said. Through the association's efforts, these were reduced, through joint meetings, to three sizes. Changes from measurement to weight methods of selling were also accomplished, he said. Much work can be done in defending the interests of the association and the industry against unfavorable legislation. A knowledge of credit is made available through a local trade organization, Col. McMahon concluded.

Booth of Nordberg Mfg. Co., winner of first prize.

During the Tuesday morning session, Otho M. Graves, in his report as chairman of the Interpretation Committee, urged the members to make use of the services of the committee, stating that it was entirely ethical to appeal for its aid in combating unfair trade practices.

The Wednesday forenoon session was allotted chiefly to the subject of concrete. W. R. Sanborn. of the Lehigh Stone Co., Kankakee, Ill., presided. H. F. Thomson, vice-president, National Ready Mixed Concrete Assn., and vice-president General Materials Corp., St. Louis, spoke on "Ready Mixed Concrete." He emphasized the idea that ready-mixed concrete is actually a raw building material instead of a stone-industry product as generally conceived. He estimates that, on the average throughout the country, the capital investments in ready-mixing plants amounts to $3 to $5 per cubic yard of annual production. This heavy charge must be offset by various attractive features in order to secure business from contractors.

Harry F. Gonnerman, manager of the research laboratory, Portland Cement Assn., Chicago, read a paper on "Researches in the Durability of Concrete." He stated that durability is dependent just as much upon the qualities of the aggregates as upon the quality of the cement, and he described researches as to the effects of unsound or unclean aggregates upon concrete durability under repeated sodium-sulphate and freezing tests.

Director A. T. Goldbeck, of the bureau of engineering, National Crushed-Stone Assn., discussed the researches that his organization has conducted during the past year with concrete. It was found that, in road pavements, flat, elongated aggregate particles are not as objectionable as ordinarily assumed. The trouble attending the inclusion of such particles has been really that the whole assembly of aggregates has not been suitably graded to assure the minimum proportion of voids.

Another interesting development has been that stone dust is not harmful when it is properly handled. Other soundness investigations dealt with the water-cement ratio and charts showed how a

heavy water content greatly lowered the concrete's ability to withstand repeated freezing tests.

L. R. Cartwright, of the Mid-West Rock Products Co., Indianapolis, Ind., as chairman, rendered the report of the association's committee on uniform cost accounting.

Next, E. R. Kinsey, president, Board of Public Service, St. Louis, spoke on "Responsibility of the Aggregate Producer as Viewed by the Engineer." This was followed by an address entitled "What Factors Control the Service Value of Ballast?" presented by J. V. Neubert, chief engineer, maintenance of way, New York Central R. R., New York.

As chairman of the association's committee on ballast, H. E. Bair, France Stone Co., Toledo, O., gave the annual report on the committee's activities. Then followed one of the most interesting

An aisle in one of the exhibition rooms.

periods in the entire convention—the report of the nominating committee on officers for the ensuing year.

The entire list of nominations for regional vice-presidents, directors, and president was approved unanimously by the members present at this large session. Principal interest centered in the circumstance that the newly-elected president, A. L. Worthen, vice-president, The Connecticut Quarries, Inc., New Haven, Conn., previously a director and a member of the executive committee, had been temporarily but seriously ill since his arrival at the convention, and had been permitted by his physician to arise and attend the session long enough to receive the official notification of his election and the good wishes of his many friends.

Two luncheons were held Wednesday. One was attended by operating men, superintendents and manufacturers, the others by members of the National Agricultural Limestone Products Assn., Inc., and others who are interested in the production of agstone.

This latter meeting was in charge of Pres. N. G. Farber of this association, assisted by W. H. Margraf, its secretary. Mr. Farber reviewed the history of the artificial application of limestone and lime to soils to improve their agricultural quality, and spoke of the opportunities afforded by his association for benefiting not only its members but the farmers in numerous localities.

The principal address was by J. R. Bent, director of the limestone-phosphate department, Illinois Agricultural Assn., Chicago. This was a splendid analysis of the serious condition that envelops agriculture throughout the world, particularly in America. In substance the matter can be explained as overproduction. Mr. Bent quoted from numerous authorities on economic matters, and explained various researches that have been and are being conducted to learn the true effects on cultivated soil reserves of natural destructive forces such as erosion, solution and gullying.

He advocated the cultivation of less land and the raising of smaller grain crops until the existing surplusage can be consumed. The average annual excess production of cereals is about 15 per cent. If only 85 per cent (or thereabouts) of the present production were planned for a few years the market prices on grains would become normal; and these crops could, with proper liming, be raised on about 75 per cent of the present acreage, enabling the farmer to till less land and yet earn more money.

During the discussion that ensued, Mr. Bent explained that limestone producers may be said to belong in two groups. One group of operators regards agstone only as an unavoidable by-product and disposes of his fines and dust as best he can to the agricultural industry. The operators in the other group purposely prepare agstone but they have established no standards as to grades or sizes of particles. In reply to an inquiry, he explained that dolomite possesses more neutralizing power than limestone but that it imparts its benefits much more slowly, especially under dry or cool conditions. Long-time experiments have been conducted to determine the rate of dolomite's solution under average Illinois climatic and tillage conditions. Material that is uniformly of 28-mesh grade yields its entire benefit in a single year whereas, with a minus ¼-in. grade, only 75 per cent of the stone will dissolve in a five-year period.

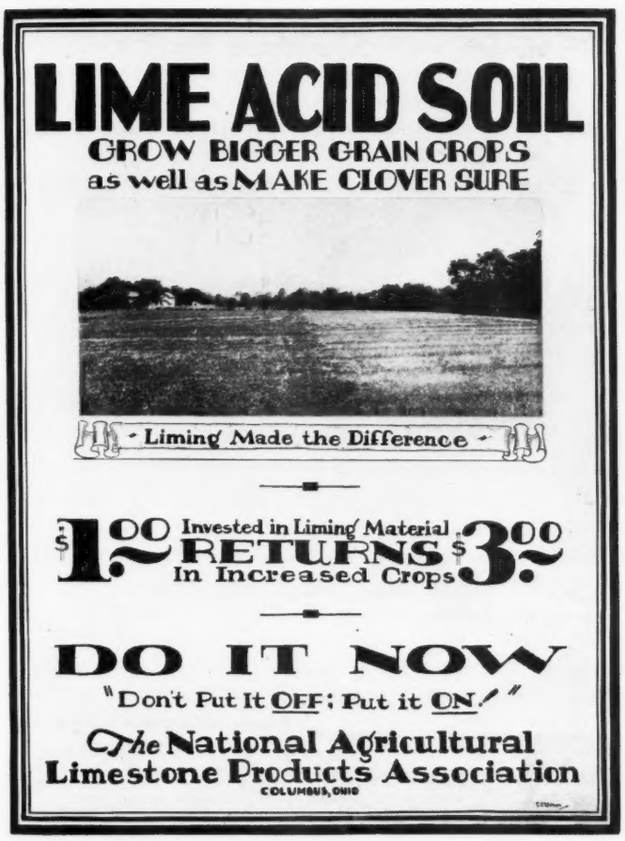
One of the interesting gatherings on Wednesday afternoon was a luncheon and group meeting, held exclusively for operating men, superintendents and manufacturers. Wm. M. Andrews, Lake Erie Limestone Co., Youngstown, O., presided. Immediately after luncheon L. D. Staplin, Carbonite Metal Co., Ltd., Chicago, addressed those attending on the subject "Crusher Bearings—Their Troubles and

Booth of Illinois Powder Co.

Remedies." Mr. Staplin's address appears in full in this issue. An interesting discussion of the points brought out by Mr. Staplin in his talk followed.

"The Prevention of Segregation and Breakage in Bins" by Major Henry Adams, Plainfield, N. J., and "The Use of Electricity in the Handling of Stone" by J. E. Borland, general engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., were the final topics to be presented at this group gathering. Discussions after each of these addresses developed several definite ideas of value to all who attended.

The association's fourteenth annual banquet was memorable and was held in one of the finest banquet rooms in the Central West. Following an excellent dinner, a program of speakers which defied a better selection, entertained the members and their guests. Otho M. Graves, as toastmaster, not only lived up


LIME ACID SOIL
GROW BIGGER GRAIN CROPS
as well as MAKE CLOVER SURE
Liming Made the Difference
$1.00 Invested in Liming Material RETURNS In Increased Crops $3.00
DO IT NOW
"Don't Put It OFF; Put it ON!"
The National Agricultural Limestone Products Association
COLUMBUS, OHIO

Poster displayed during session of National Agricultural Limestone Products Assn., Inc.

to his reputation as a capable speaker but added an interest and sparkle to the program.

John B. Kennedy, associate editor of *Collier's Weekly* and formerly a war correspondent, spoke on "Civics for the Civilized." He stressed the spiritual in business, and noted that the human spirit cannot be done away with. "Count Anton Carlson, president of the Sweden-Norway Crushed Stone Assn." gave a speech filled with humorous anecdotes, in that ever-enjoyable Scandinavian accent which is characteristic of his race. The count's audience rollicked in laughter and when, at the close of his speech, he revealed his identity as Axel B. Christen-

Group of booths in corner of one room.

son, well-known radio announcer of radio station WBBM, Chicago, a tumult of laughter and applause was extended for his clever hoax.

The Hon. Joseph T. Robinson, U. S. Senator from Arkansas and Democratic nominee for vice-president during the last campaign, addressed the convention on a subject reviewing the past business depression. His analysis of this world-wide problem was intellectual, concise, and accurate, and was well received because he is a man who holds a vital position in the government of our country.

President W. F. Wise presided at the Thursday morning session. Several papers were read and discussed, accident-prevention work occupying a considerable part of the program.

Considered by many as the most outstanding talk of the entire convention program was "Mental Self-Discipline Aids in Industry" delivered by Dr. H. S. Hulbert, noted psychiatrist of Chicago, Ill. Dr. Hulbert told of the interest taken in the practical application of psychiatric knowledge and of the vast amount of work done in the hospitals, institutions and jails in the gathering of the data for this knowledge. He pointed out that the sympathetic-nervous system is much more complex than the intellect, requiring much more research to obtain the facts. The doctor answered the common question, "Are there means whereby we can size and evaluate a man quickly"? by saying "Yes, there are means; some good, and some not so good. In any case check up the result with common sense. If your common sense disagrees, bet on your common sense." "Watch him work," Dr. Hulbert continued, "place him on a period of probation for observation, then reconsider, and use your own judgment." The doctor proceeded with a chalk talk, drawing a graph for the convention—the human graph. This showed clearly the human behavior characteristics, the 70-per cent normal and the 30-per cent extremist. The graph applies not only to the intelligence of humans, but shows the same proportion, for other facts, the ages of humans, amount of money possessed by individuals, the success and failure proportion. In fact, the curve indicates such an accurate cross section of every aspect of human life that it is called the human graph. It is in the 70-per cent group indicated from the curve of this graph that we should wish to be, he said, for natural selection, nature's inviolate law, dictates that

Typical aisle in an exhibition hall.

the extremes of any group are certain to perish.

Dr. Hulbert decried the practice of day-dreaming, also known as fantasies, reveries, and wistful thinking. While common in youthful minds, it is an expensive habit. We seldom tend to carry out our day dreams, and are led to disappointment and eventual loss of self-respect and confidence because of the failure of the day-dream plans. All day-dreams begin with, "if," "I wish," or "when," and the doctor urged his audience to scrutinize these thoughts. The world likes persons who react, who are agreeable and who can produce—characteristics which cannot permit day-dreaming or wistful thinking, he said in substance. Day-dreaming is a large source of accidents, he asserted, and he related examples to bear out his statement.

Worriers are excessive day-dreamers in their youth. Instead of worrying, do something. If a man is worrying about an expectant wife, permit him to phone the hospital as many times as he likes, to place his mind at ease. It is utterly impossible to accomplish anything when the mind is wrought with worry. Happiness, the doctor said, increases accuracy and diminishes fatigue. Unhappiness decreases accuracy and increases fatigue.

A self-respecting person is respected by others, Dr. Hulbert stated. The basis for self-respect is a good or improving health, and an honest self-evaluation. You can't shame a man into observing company rules. Build up his self respect, said Dr. Hulbert, and he advised his audience to differentiate an offense from an offender, and to correct the offender in the proper proportion from two slaps on the back to a kick in the pants, as the doctor put it.

The subject of nervous breakdown was explained. This is caused by the combination of broken-down health and an emotional strain. The remedy for it is careful observance of health principles and the maintenance of a healthy body. Good health will permit one to impose upon it at times, and to this he added that one cannot afford to drink more than three times a year unless he has seventeen times the resistance of the normal man.

The convention gave Dr. Hulbert a tumult of applause. One member of the audience was overheard to say, "That speech alone was worth more than the cost of the convention, and I am sorry I couldn't have heard it earlier in life."

After Dr. Hulbert's talk, W. W. Adams of the U. S. Bureau of Mines was called upon to present the National Crushed Stone Assn. safety trophies. The Marquette Cement Manufacturing Company's plant at Cape Girardeau, Mo., won the Explosives Engineer trophy for the second time for having no lost-time accidents during the year 1929 with the greatest number of man-hours. The presentation was made to M. P. Greer, the safety engineer of the Marquette company. Mr. Adams reviewed the excellent record of this plant and other plants of the company and commended Mr. Greer for his fine work. It is understood that the same plant of the Marquette company will be eligible to receive the trophy a third time as it has added 1930 to its list of no lost-time accident years. In the event it wins, the trophy becomes its permanent possession.

The Speed quarry of the Louisville Cement Co., at Speed, Ind., received a silver loving cup for having had no lost-time accidents in a period of five calendar years. Mr. Buckeye received the award. This quarry, with an unbroken record from 1924 until October, 1930, possesses a most enviable record, and Mr. Buckeye will return to his fellow employees with the congratulations of the industry.

View from entrance to one hall.

Earlier in the program, a paper entitled "The Control of Accidents," was read by T. J. Quigley, chief, Mines and Quarries section, Dept. of Labor and Industry, Pennsylvania. Mr. Quigley expressed the hope that the National Crushed Stone Assn. would establish a safety program and promote its practice among the members of the industry. He reviewed the remarkable reduction in accidents obtained since this work began with the cement-rock quarries whose operators are members of the Portland Cement Assn. Eleven quarries in this section have had no lost-time accidents for three calendar years, and one has had no lost-time accidents in five years. Mr. Quigley cited examples of the remarkable work done in quarries to reduce the accident rate. He particularly condemned the portable-type plant because of its usual utter lack of safety practices. The members of the association should demand that the physical condition of a plant be a factor in the determination of the accident-insurance rate as well as the safety record, Mr. Quigley declared. He recommended that a definite rating be given to quarries in classes according to the percentage of employees injured.

For the purpose of awarding suitable trophies for accident prevention, a bill has been prepared by Senator Reed asking for an appropriation of $10,000. Mr. Quigley urges its support to further the interest in this work, and asks that all members communicate with their senators for support of the bill.

J. V. Scott, director of the Service Extension of the National Safety Council, read a paper on the subject of accident prevention. One of its highlights was an appeal to the members to teach and practice safety in the homes. At the Hawthorne plant of the Western Electric Co., Chicago, Ill., where 28,000 men and women are employed, only one fatal accident occurred during the past year, while thirteen deaths of employees occurred in accidents in the homes or outside of the company's province. Mr. Scott was later questioned concerning the cost of the service of the National Safety Council, to which he replied, quoting the rates of membership.

Otho M. Graves then introduced Chas. M. Upham who spoke on "The Secondary Road Problem." Mr. Upham is engineer-director, American Road Builders Assn., Washington, D. C. He told of the budget for road construction, $2,500,000,000 having been spent during 1930. Of this, the county allotment was from five to six millions, with a possibility of an increased amount during the current year. Tracing the difficulties of the present methods of county highway construction, Mr. Upham declared that the principal one was in the administration of funds and effort. An unfortunate condition exists in many counties because of the lack of planning, lack of surveys of traffic conditions, and utter waste of funds. In Mid-western counties he summarizes the outstanding causes for the deplorable conditions present as: Elected authorities have no abilities for highway administration, other influences to divert funds, county unit too small to pay costs of highway construction and county too small to keep equipment working full time.

For the correct procedure in the construction of county highways, Mr. Upham summarized, surveys should be made of first, the county financial condition; second the traffic conditions with a study of the type of activity; and third, new locations of roads for possible state systems. The same specifications should be used as adopted by the state highway departments, he recommended.

Mr. Upham showed several slides illustrating the expenditures of county funds, their source, and other items in highway construction.

The next order of business taken up was the adoption of a number of resolutions which were presented by John Rice, chairman of the resolutions committee. Among them was a resolution directed to the President of the United States and both Houses of Congress for an investigation as to the means whereby an industry might protect itself from price conditions tending to ruin its members.

Following the adoption of the resolutions, the installation of officers took place. President Wise, in a short speech, wished President-elect A. L. Worthen the best of success and thanked all those whose coöperation and support he enjoyed during his two-year term as president. Mr. Worthen received the gavel and expressed the hope that he would have the same feeling of satisfaction of a good job done well when leaving the presidential office, as he knew Mr. Wise had.

A farewell luncheon closed the convention.

REGISTRATION

Active Members

Abrell, R. D., Columbia Quarry Co., St. Louis, Mo.
Adams, C. G., France Stone Co., Toledo, O.
Adams, William J., Cushing Stone Co., Schenectady, N. Y.
Allen, H. B., General Crushed Stone Co., Philadelphia, Pa.
Altgelt, Max A., New Braunfels Limestone Co., New Braunfels, Tex.
Andrews, Wm. M., Lake Erie Limestone Co., Youngstown, O.
Arters, G. F., The John T. Dyer Quarry Co., Birdsboro, Pa.
Atwood, E. R., Old Colony Crushed Stone Co., Quincy, Mass.

Babcock, B. R., The Callanan Road Improvement Co., South Bethlehem, N. Y.
Bair, H. E., The France Stone Co., Toledo, O.
Bales, M. M., Elmhurst-Chicago Stone Co., Elmhurst, Ill.
Bannister, A. H., Moulding-Brownell Corp., Chicago, Ill.
Battin, H. E., Jr., Callanan Road Improvement Co., Albany, N. Y.
Beam, C. C., C. C. Beam, Inc., Melvin, Ohio.
Beam, James B., Sunbeam Quarries Co., Bardstown, Ky.
Beam, T. J., Sunbeam Quarries Co., Clermont, Ky.
Beerhalter, J. R., Duluth Crushed Stone Co., Duluth, Minn.
Bibb, F. T., Genesee Stone Prod. Corp., Batavia, N. Y.
Blakeslee, Albert D., New Haven Trap Rock Co., New Haven, Conn.
Bovee, Meredith, General Crushed Stone Co., Syracuse, N. Y.
Boxley, L. J., Blue Ridge Stone Corp., Roanoke, Va.
Boyd, J. R., National Crushed Stone Ass'n, Washington, D. C.
Branstetter, B. B., Stewart Sand & Material Co., Columbia, Mo.
Brewer, R. D., Conn. Quarries Co., Inc., Plainville, Conn.
Brewer, C. D., Duluth Crushed Stone Co., Duluth, Minn.
Buchholtz, C. L., Genesee Stone Products Corp., Batavia, N. Y.
Buckhert, J. M., Louisville Cement Corp., Louisville, Ky.

Campbell, R. S., Holston Quarry Co., Knoxville, Tenn.
Carson, W. W., Jr., Texas Crushed Stone, Sand and Gravel Association, Austin, Tex.
Carswell, W. B., Stewart Sand Co., Kansas City, Mo.
Carter, W. N., National Stone Co., Joliet Ill.
Cartwright, L. R., Midwest Rock Prod. Corp., Indianapolis, Ind.
Chamberlain, O. P., Dolese & Shepard Co., Chicago, Ill.
Christian, M. H., Pounding Mill Quarry, Pounding Mill, Va.
Clark, Claude L., Ohio Crushed Stone Assn., Columbus, Ohio.
Clark, Harvey N., Dolomite Products Co., Rochester, N. Y.
Cooke, Ted C., Lynn Sand and Stone Co., Swampscott, Mass.
Coulter, Scott, General Crushed Stone Co., Cazenovia, N. Y.
Cox, H. L., General Crushed Stone Co., Watertown, N. Y.
Craig, R. A., Pounding Mill Quarry, Pounding Mill, Va.
Cramer, F. W., York Valley Lime and Stone Co., York, Pa.
Crawford, Lee, Builders Material Co., Cedar Rapids, Ia.
Crawley, John J., Orange Quarry Co., Montclair, N. J.
Croll, L. M., General Crushed Stone Co., Phelps, N. Y.
Cunningham, R. W., Canada Crushed Stone Corp., Hamilton, Ont., Canada.
Curnutt, W. W., American Limestone Co., Knoxville, Tenn.
Cushing, J. C., Cushing Stone Co., Inc., Schenectady, N. Y.
Cushing, J. E., Cushing Stone Co., Inc., Schenectady, N. Y.

Davies, Beulah, National Crushed Stone Ass'n, Washington, D. C.
Dixon, Samuel F., Orange Quarry Co., West Orange, N. J.
Dodd, Allen C., Illinois Electric Limestone Co., St. Louis, Mo.
Doolittle, C. M., Hamilton, Canada.
Doran, W. J., Big Bend Quarry Co., St. Louis, Mo.

Dotter, E. E., General Crushed Stone Co., Quakertown, Pa.
Duff, W. W., Union Limestone Co., New Castle, Pa.

Earnshaw, Fred O., The Carbon Limestone Co., Youngstown, O.
Edwards, F. H., The Conn. Quarries Co., New Haven, Conn.
Elmer, Earl, Eastern Rock Products Co., Utica, N. Y.
Esser, R. P., National Lime & Stone Co., Findlay, Ohio.
Eyermann, Wm. J., Eyermann Contracting Co., St. Louis, Mo.

Faylor, E. W., General Crushed Stone Co., Glen Mills, Pa.
Faylor, G. D., General Crushed Stone Co., Port Deposit, Md.
Fisher, Wm. R., Big Bend Quarry Co., Maplewood, Mo.
Foote, W. E., Wickwire Spencer Steel Co., Gasport, N. Y.
Fredericks, Geo. J., Consolidated Stone & Sand Co., Montclair Heights, N. J.

Gilbert, Ellwood, New Castle Lime and Stone Co., New Castle, Pa.
Glassen, C. E., Columbia Quarry Co., Columbia, Ill.
Goldbeck, A. T., National Crushed Stone Association, Washington, D. C.
Gould, E. M., Marquette Cement Mfg. Co., Cape Girardeau, Mo.
Gravenhorst, K. C., Builders Material Co., La Porte City, Ia.
Graves, O. M., General Crushed Stone Co., Easton, Pa.
Gray, Jos. E., National Crushed Stone Assn., Washington, D. C.
Gray, Latham B., Eastern Rock Products, Inc., Utica, N. Y.
Greer, M. P., Marquette Cement Mfg. Co., Cape Girardeau, Mo.
Gucker, F. T., The John T. Dyer Quarry Co., Norristown, Pa.

Hall, A. Acton, The Ohio Marble Co., Piqua, Ohio.
Hall, W. H., Old Colony Crushed Stone Co., Hartford, Conn.
Hammerschmidt, Martin, Elmhurst-Chicago Stone Co., Elmhurst, Ill.
Hawthorne, J. D., General Crushed Stone Co., Akron, N. Y.
Heidenreich, Edw. L., Jr., N. Y. Trap Rock Corp., Newburgh, N. Y.
Heimlich, W. R., LeRoy Lime and Crushed Stone Co., LeRoy, N. Y.
Heise, E. A., Columbia Quarry Co., Columbia, Ill.
Hemphill, R. A., Weston and Brooker Co., Trenton, S. C.
Hencke, R., Rock Hill Quarries Co., St. Louis, Mo.
Herster, A. L., The General Crushed Stone Co., Easton, Pa.
Hewitt, Wm. E., Moulding-Brownell Corp., Chicago, Ill.
Hickey, D. C., The General Crushed Stone Co., Syracuse, N. Y.
Hilliard, Wm. E., New Haven Trap Rock Co., New Haven, Conn.
Hinds, W. J., General Crushed Stone Co., Lacona, N. Y.
Hipple, John A., Penn Lime, Stone and Cement Co., Rheems, Pa.
Holstein, Lewis, The John T. Dyer Quarry Co., Birdsboro, Pa.
Hooker, A. J., Buffalo Crushed Stone Co., Buffalo, N. Y.
Howe, Frank M., LeRoy Lime and Crushed Stone Corp., LeRoy, N. Y.
Humberston, E. H., Marble Cliff Quarries Co., Columbus, O.
Hummel, Robert J., National Stone Co., Joliet, Ill.
Hunter, C. M., Jr., Pounding Mill Quarry, Pounding Mill, Va.

Immel, R. P., American Limestone Co., Knoxville, Tenn.

Jackson, H. T., Stewart Sand Co., Kansas City, Mo.
Jackson, Joseph H., Carbon Limestone Co., Youngstown, Ohio.
Jacoby, P. H., General Crushed Stone Co., White Haven, Pa.
Jacoby, Ralph, Illinois Electric Limestone Co., St. Louis, Mo.
Jamison, T. R., The Weston and Brooker Co., Camak, Ga.
Johnson, David, The John T. Dyer Quarry Co., Birdsboro, Pa.
Johnston, H. A., Van Camp Stone Co., Lebanon, Ohio.
Jones, Frank S., The General Crushed Stone Co., Easton, Pa.

Kaufman, E. J., Marble Cliff Quarries Co., Columbus, Ohio.
Keim, E., The John T. Dyer Quarry Co., Birdsboro, Pa.
Keim, Frank F., The Trumbower Co., Nazareth, Pa.
Kelleher, Thomas J., New York Trap Rock Corp., Verplanck, N. Y.
Kieffer, W. T., Columbia Quarry Co., St. Louis, Mo.
Kimball, Frank B., Connecticut Quarries Co., Inc., Wallingford, Conn.
Kirkpatrick, L. W., Lambertville Trap Rock Co., Lambertville, N. J.
Klaus, C. E., Columbia Quarry Co., Columbia, Ill.
Knoblauch, C., National Lime & Stone Co., Findlay, Ohio.
Krause, Dr. C. H., Columbia Quarry Co., St. Louis, Mo.
Krause, E. J., Columbia Quarry Co., St. Louis, Mo.
Krause, H. C., Columbia Quarry Co., St. Louis, Mo.
Kriege, Herbert F., France Stone Co., Toledo, O.

LaBarge, J. B., Zenith Limestone Co., Tulsa, Okla.
Lacy, Robt., T. C. Hubbert and Co., Inc., Wilmington, Del.
Lanagan, T. A., General Crushed Stone Co., Winchester, Mass.
Lane, Arthur S., John S. Lane & Son, Inc., Meriden, Conn.
Lanham, F. H., Sunbeam Quarries Co., Louisville, Ky.
Latham, C. Harold, Hartford Sand and Stone Co., Hartford, Conn.
Long, Frank J., West Roxbury Trap Rock Co., West Roxbury, Mass.
Lumsden, A. W., Pembroke Limestone Corp., Pembroke, Va.

Mack, P. J., Stewart Sand Co., Kansas City, Mo.
Manahl, Herbert E., Dubuque Stone Products Co., Dubuque, Ia.
Manchester, W. D., Lynn Sand and Stone Co., Swampscott, Mass.
Margraf, W. H., Marble Cliff Quarries Co., Columbus, Ohio.
Matchett, C. H., General Crushed Stone Co., Easton, Pa.
McCloskey, Thomas, Jr., Holston Quarry Co., Knoxville, Tenn.
McCroskey, Thos., American Limestone Co., Knoxville, Tenn.
McCullough, J. W., Rock Hill Quarries Co., St. Louis, Mo.
McKeon, M. V., General Crushed Stone Co., Winchester, Mass.
McKernan, Alex, New Haven Trap Rock Co., New Haven, Conn.
McKinney, B. A., West Roxbury Trap Rock Co., West Roxbury, Mass.
McLaughlin, F. F., The General Crushed Stone Co., Syracuse, N. Y.
McMahon, E. J., St. Louis Quarrymen's Ass'n., St. Louis, Mo.
McNabb, Hugh M., Federal Crushed Stone Corp., Buffalo, N. Y.
McThenia, A. W., Acme Limestone Co., Alderson, W. Va.
Meyer, R. W., Marquette Cement Mfg. Co., St. Louis, Mo.
Miller, L. F., New York Trap Rock Corp., Haverstraw, N. Y.
Mohr, Wm., The John T. Dyer Quarry Co., Birdsboro, Pa.
Moore, John D., Illinois Electric Limestone Co., St. Louis, Mo.
Moore, Redington, General Crushed Stone Co., Easton, Pa.
Moscrip, A. L., Moulding-Brownell Corp., Chicago, Ill.
Munson, Clarence A., New Haven Trap Rock Co., New Haven, Conn.
Murphy, Grover J., The General Crushed Stone Co., Little Falls, N. Y.
Murphy, Thos., Columbia Quarry Co., Bonne Terre, Mo.
Murray, Maurice, The John T. Dyer Quarry Co., Birdsboro, Pa.

Nettleton, Elwood T., Connecticut Quarries Co., Inc., New Haven, Conn.
Norton, F. C., Hollister Trap Rock Co., Boston, Mass.

Odenbach, John, Dolomite Products Co., Rochester, N. Y.
Ogden, I. A., Dittlinger Lime Co., New Braunfels, Tex.
Owens, F. C., The General Crushed Stone Co., Syracuse, N. Y.

Patterson, F. R., National Lime & Stone Co., Findlay, Ohio.
Paynter, W. B., Kentucky-Virginia Stone Co., Middlesboro, Ky.

Perry, Edw. T., New Haven Trap Rock Co., Providence, R. I.
Prince, John, Stewart Sand and Material Co., Kansas City, Mo.
Putnam, Lewis H., General Crushed Stone Co., Watertown, N. Y.

Quinn, W. F., Connecticut Quarries Co., Rocky Hill, Conn.

Rainer, H. E., Federal Crushed Stone Corp., Buffalo, N. Y.
Rarey, Russell, Marble Cliff Quarries Co., Columbus, Ohio.
Rayoun, J. P., Casper Stolle Quarry & Cont. Co., East St. Louis, Ill.
Reinhold, P. B., Reinhold & Co., Inc., Pittsburgh, Pa.
Rex, B. P., The General Crushed Stone Co., Easton, Pa.
Rice, John, General Crushed Stone Co., Easton, Pa.
Rice, John, Jr., General Crushed Stone Co., Easton, Pa.
Rigg, H. M., Acme Limestone Co., Alderson, W. Va.
Rigg, J. A., Acme Limestone Co., Alderson, W. Va.
Riley, Doris H., National Crushed Stone Ass'n., Washington, D. C.
Robertson, John F., Cedar Bluff Quarry, Princeton, Ky.
Robinson, H. O., Greenfield Mass. Broken Stone Co., Greenfield, Mass.
Robinson, Lawrence, Greenfield Mass. Broken Stone Co., Greenfield, Mass.
Robinson, Ralph M., John S. Lane & Son, Inc., Meriden, Conn.
Rodes, A. B., Franklin Limestone Co., Nashville, Tenn.
Rodes, H. E., Franklin Limestone Co., Nashville, Tenn.
Rose, Robt., The Conn. Quarries Co., New Haven, Conn.
Rowan, Henry A., The John T. Dyer Quarry Co., Birdsboro, Pa.

Sanborn, Dan, Lehigh Stone Co., Kankakee, Ill.
Sanborn, W. R., Lehigh Stone Co., Kankakee, Ill.
Santee, Wm. J., The Trumbower Co., Nazareth, Pa.
Savage, James, Buffalo Crushed Stone Co., Buffalo, N. Y.
Schaefer, Geo. E., The General Crushed Stone Co., Rochester, N. Y.
Schmalz, A. H., Eyermann Contracting Co., St. Louis, Mo.
Schmidt, F. W., North Jersey Quarry Co., Morristown, N. J.
Schmitt, Harry F., Columbia Quarry Co., St. Louis, Mo.
Schmoeller, Clyde C., Mississippi Lime & Material Co., Alton, Ill.
Schollmeyer, Louis A., Union Quarry Co., St. Louis, Mo.
Schroeder, John F., Linwood Cement Co.
Schwartz, Harry, The John T. Dyer Quarry Co., Birdsboro, Pa.
Scott, A. L., General Crushed Stone Co., LeRoy, N. Y.
Seitz, A. G., General Crushed Stone Co., Syracuse, N. Y.
Severinghaus, Nelson, Consolidated Quarries Co., Lithonia, Ga.
Sharp, H. M., The France Stone Co., Toledo, Ohio.
Shauck, Ruth E., Nat'l Crushed Stone Ass'n., Washington, D. C.
Shepherd, R. C., Carbon Limestone Co., Hillsville, Pa.
Skinner, Bessie Mae, Nat'l Crushed Stone Ass'n., Dallas, Tex.
Skrainka, Louis, Big Bend Quarry Co., St. Louis, Mo.
Skrainka, Walter J., Big Bend Quarry Co , St. Louis, Mo.
Souders, E. G., The John T. Dyer Quarry Co., Norristown, Pa.
Sparks, W. C., Cedar Bluff Quarry, Princeton, Ky.
Sporborg, W. L., General Crushed Stone Co., Syracuse, N. Y.
Spurr, Chas. H., Marquette Cement Mfg. Co., Oglesby, Ill.
Steininger, Harry F., Union Quarry Co., St. Louis, Mo.
Stolle, Carl A., Casper Stolle Quarry and Const. Co., E. St. Louis, Ill.
Stolle, F. W., The Casper Stolle Quarry & Const. Co., East St. Louis, Ill.
Stull, J. W., Liberty Limestone Corp., Rocky Point, Va.

Taff, Frederick N., North Jersey Quarry Co., Morristown, N. J.
Tigges, Chas. P., Illinois Electric Limestone Co., St. Louis, Mo.
Tomlins, G. M., N. Y. Trap Rock Corp., Haverstraw, N. Y.
Travilla, Jas. C., Pilot Knob Ore Co., St. Louis, Mo.

Ward, C. E., Columbia Quarry Co., Murphysboro, Ill.
Watson, D. Roy, Canada Crushed Stone Corp., Ltd., Hamilton, Ont.
Webb, F. C., Tower Grove Quarry, St. Louis, Mo.
Webb, Gertrude L., Tower Grove Quarry & Construction Co., St. Louis, Mo.
Weiman, W. J., General Crushed Stone Co., Auburn, N. Y.
Welch, H. R., Marble Cliff Quarries Co., Columbus. O.
Weston, T. I., Weston and Brooker Co., Columbia, S. C.
Williams, Ray, Stewart Sand Co., Kansas City, Mo.
Wilson, A. J., Granite Rock Co., Watsonville, Cal.
Wilson, H. G., Columbia Quarry Co., St. Louis, Mo.
Wise, W. F., Southwest Stone Co., Dallas, Texas.
Worthen, A. L., Connecticut Quarries Co., Inc., New Haven, Conn.
Wortman, Irving W., North Jersey Quarry Co., Morristown, N. J.

Yotter, H. F., The General Crushed Stone Co., Easton, Pa.

Some of the ladies about to start upon a sight-seeing tour.

Associate Members

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Alexander, J. C., Bucyrus-Erie Co., Boston, Mass.
Allen, John A., New York Cordage Co., New York, N. Y.
Andres, B. R., Bucyrus-Erie Co., St. Louis, Mo.
Andrews, C. B., Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Ashcroft, Jerome, Ludlow-Saylor Wire Co., St. Louis, Mo.
Austin, W. J., Hercules Powder Co., Chicago, Ill.
Avery, Harry C., Niagara Concrete Mixèr Co., Buffalo, N. Y.
Aydt, Miss Betty, Illinois Powder Mfg. Co., St. Louis, Mo.

Bachman, Harry L., The Jaeger Machine Co., Columbus, Ohio.
Baldwin, M. H., Burrell Engineering and Const. Co., Chicago, Ill.
Barab, J., Hercules Powder Co., Wilmington, Del.
Barber, F. D., Simplicity Engineering Co., Durand, Mich.
Barnhart, Henry, Ohio Power Shovel Co., Lima, Ohio.
Bartlett, A. G., Burton Explosives, Inc., West Frankfort, Ill.
Bassler, A. H., Illinois Powder Mfg. Co., St. Louis, Mo.
Bauer, Eugene C., Kensington Steel Co., Chicago, Ill.
Baughman, R. H., Sauerman Bros., Inc., Chicago, Ill.
Beebe, Lucius, Troco Lubricating Co., Philadelphia, Pa.
Beebe, W. R., Bucyrus-Erie Co., Buffalo, N. Y.
Behnke, Geo. W., Simplicity Engineering Co., Durand, Mich.
Beisber, Mat. F., PIT AND QUARRY, Chicago, Ill.
Benedict, C. L., Chicago Pneumatic Tool Co., New York, N. Y.
Berger, Oscar H., Macasphalt Corp. of America, New York, N. Y.
Berteling, John F., Sullivan Machinery Co., Chicago, Ill.
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Borland, J. E., Westinghouse Elec. and Mfg. Co., East Pittsburgh, Pa.
Broan, Wm., Ingersoll-Rand Co., Chicago, Ill.
Brockman, H. J., Illinois Powder Mfg. Co., Memphis, Tenn.
Brockman, T. A., Illinois Powder Mfg. Co., St. Louis, Mo.
Brockman, T. Geo., Illinois Powder Mfg. Co., Nashville, Tenn.
Brown, Edwin C., Good Roads Mach. Co., Kennett Square, Pa.
Browning, K. A., Illinois Powder Mfg. Co., St. Louis, Mo.
Buchanan, Hugh H., Bucyrus-Erie Co., St. Louis, Mo.
Buell, Fred, Simplicity Engineering Co., Durand, Mich.
Burns, T. A., Harnischfeger Corp., New York City.
Burton, J. S., Burton Explosives, Inc., Cleveland, O.
Busch, A. D., The W. S. Tyler Co., Cleveland, Ohio.
Buschman, W. A., PIT AND QUARRY, Chicago, Ill.

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Clark, J. O. F., American Manganese Steel Co., St. Louis, Mo.
Clayton, Leroy, Atlas Powder Co., Joplin, Mo.
Colby, A. C., Nordberg Mfg. Co., Milwaukee, Wis.
Collier, J. C., Allis-Chalmers Mfg. Co., Chicago, Ill.
Collins, R. T., Illinois Powder Co., St. Louis, Mo.
Conant, R. W., Bucyrus-Erie Co., New York City.
Conley, H. H., Peerless-Union Explosives Corp., LeRoy, N. Y.
Courtright, John P., Marion Steam Shovel Co., Chicago, Ill.
Cox, Irving K., Allis-Chalmers Mfg. Co., New York City.
Crew, J. B., Marion Steam Shovel Co., Marion, Ohio.
Crocker, J., Ingersoll-Rand Co., New York, N. Y.

Daniels, A. W., Amer. Manganese Steel Co., Chicago Heights. Ill.
Davis, W. C., Atlas Powder Co., Philadelphia, Pa.
Davison, H. M., Harnischfeger Sales Corp., Milwaukee, Wis.
Davisson, Geo. W., Marion Steam Shovel Co., St. Louis, Mo.
Deister, Irwin F., Deister Machine Co., Ft. Wayne, Ind.
Doernhoefer, E. G., The Ludlow-Saylor Wire Co., St. Louis, Mo.
Doty, C. H., Keith-Dunham Co., Chicago, Ill.
Dow, John A., Colprovia Roads, Inc., New York, N. Y.
Dunckel, R. C., Simplicity Engineering Co., Columbus, Ohio.
Dunn, W. O., Burton Explosives, Inc., Cleveland, Ohio.
Dyke, Geo. M., The Stearns Conveyor Co., E. Cleveland, Ohio.

Earnshaw, Geo. S., Illinois Powder Mfg. Co., Youngstown, O.
Edwards, J. I., Chicago Pneumatic Tool Co., New York City.
Ellis, Wilbur, Kensington Steel Co., Chicago, Ill.
Ellsworth, S. S., Ensign Bickford Co., Simsbury, Conn.
Essig, B. C., Gardner Denver Co., Quincy, Ill.
Evans, Paul T., Atlas Powder Co., Wilmington, Del.

Farrell, J. C., Easton Car & Const. Co., Easton, Pa.
Farrell, W. E., Easton Car & Const. Co., Easton, Pa.
Farrier, A. M., Amer. Car & Foundry Co., New York, N. Y.
Fawcett, J. W., Bucyrus-Erie Co., New York City.
Fleming, E. W., The Hitchcock Co., Boston, Mass.
Fraunfelder, G. D., Easton Car & Const. Co., Easton, Pa.
Fugate, C. W., Deister Contractor Co., Ft. Wayne, Ind.

Gainty, W. F., Hercules Powder Co., Chicago, Ill.
Garber, M. B., The Thew Shovel Co., Lorain, Ohio.
Garden, Geo., Illinois Powder Mfg. Co., St. Louis, Mo.
Gaut, Chas. H., Nordberg Mfg. Co., Knoxville, Tenn.
Goldberg, Abe, Allis Chalmers Mfg. Co., Milwaukee, Wis.
Gower, J. B., Simplicity Engineering Co., Chicago, Ill.
Gracely, Harvey T., Marion Steam Shovel Co., Marion, Ohio.
Green, B. E., Huron Industries, Inc., Alpena, Mich.
Green, R. S., American Steel & Wire Co., Chicago, Ill.
Greensfelder, Nelson S., Hercules Powder Co., Wilmington, Del.
Griffin, I. M., Jr., Illinois Powder Mfg. Co., Dallas, Tex.

Hamilton, H. H., Du Pont Co., St. Louis, Mo.
Hammond, A. D., Atlas Powder Co., New York, N. Y.
Harder, C. W., Simplicity Engineering Co., Louisville, Ky.
Harper, Lawrence M., Woodford Engineering Co., Chicago, Ill.
Harsh, Earl C., *Rock Products*, Chicago, Ill.
Harter, A. H., Illinois Powder Mfg. Co., St. Louis, Mo.
Hawley, Guy D., F. M. Welch Engineering Service, Greenville, O.
Heffelfinger, G. B., Marion Steam Shovel Co., Marion, Ohio.
Heppler, W. A., The Hitchcock Co., Chicago, Ill.
Herman, J. B., American Car and Foundry Co., St. Louis, Mo.
Hoskin, A. J., PIT AND QUARRY, Chicago, Ill.
Hudson, L. D., Nordberg Mfg. Co., New York, N. Y.
Hudson, L. D., Jr., Nordberg Mfg. Co., New York City.
Hughes, A. D., Trojan Powder Co., Allentown, Pa.
Huntington, C. S., Link-Belt Co., Chicago, Ill.
Hutchins, H. A., Northwest Engineering Co., Chicago, Ill.

Ingersoll, James W., Niagara Concrete Mixer Co., Buffalo, N. Y.

Johann, H. A., The Frog Switch & Mfg. Co., Chicago, Ill.

Keane, LeRoy, Hercules Powder Co., Columbus, Ohio.
Kelley, R. F., Burton Explosives, Inc., Cleveland, Ohio.
Kincaid, M. S., Burton Explosives, Inc., Cleveland, Ohio.
King, M. A., Good Roads Machinery Co., Inc., Chicago, Ill.
King, W. W., W. S. Tyler Co., Cleveland, Ohio.
Kitts, J. W., Good Roads Machinery Co., Inc., Kennett Square, Pa.
Koster, J. W., Du Pont Co., Wilmington, Del.

Lambert, Max S., Robins Conveying Belt Co., Chicago, Ill.
Larson, Chas., Ingersoll-Rand, Picher, Okla.
Lewis, E. G., Bucyrus-Erie Co., New York, N. Y.
Lillard, G. L., Harnischfeger Sales Corp., Memphis, Tenn.
Lincoln, C. S., Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Little, James R., Illinois Powder Mfg. Co., St. Louis, Mo.

MacFadyen, L. E., Taylor Wharton Iron & Steel Co., Philadelphia, Pa.
McGonigle, Walter L., Cleveland Rock Drill Co., Chicago, Ill.

McKinley, J. H., Manganese Steel Forge Co., Pittsburgh, Pa.
McLanahan, J. C., McLanahan & Stone Corp., Hollidaysburg, Pa.
MacIntosh, R., Troco Lubricating Co., Philadelphia, Pa.
MacLachlan, Thos., Vulcan Iron Works, New York, N. Y.
Martin, E. H., Simplicity Engineering Co., Durand, Mich.
Martin, Geo. E., The Barrett Co., New York City, N. Y.
Martin, Richard, Illinois Powder Mfg. Co., Tulsa, Okla.
Marshall, W. B., Stearns Conveyor Co., Cleveland, O.
Milroy, W. H., Earle C. Bacon, Inc., New Haven, Conn.
Morrison, F. G., Illinois Powder Mfg. Co., St. Louis, Mo.
Morrissey, J. W., Earle C. Bacon, Inc., New York, N. Y.
Moses, M. J., Illinois Powder Mfg. Co., St. Louis, Mo.
Mullally, W. J., Amer. Manganese Steel Co., Chicago Heights, Ill.

Nicol, W. S., Cross Engineering Co., Carbondale, Pa.
Nothacker, W. F., Sanderson Cyclone Drill Co., Orrville, Ohio.

Oldham, Edward L., Cleveland Rock Drill Co., Cleveland, Ohio.
O'Brien, J. F., Vulcan Iron Works, Chicago, Ill.
O'Neil, W. D., Buffalo Wire Works Co., Buffalo, N. Y.
Owen, A. E., Niagara Concrete Mixer Co., Cleveland, Ohio.

Perry, L. C., Good Roads Machinery Co., St. Louis, Mo.
Phillips, W. W., E. I. du Pont de Nemours & Co., Inc., Cleveland, Ohio.
Phillips, S. A., PIT AND QUARRY, Chicago, Ill.
Piggott, Wallace J., W. S. Tyler Co., Cleveland, Ohio.
Pietsch, W. Vincent, Earle C. Bacon, Inc., New York, N. Y.
Potter, W. H., Manganese Steel Forge Co., Chicago, Ill.

Rabbett, C. F., Nat'l Equip. Corp.
Randle, John R., Ingersoll-Rand Co., St. Louis, Mo.
Redman, H. W., Koppel Industrial Car & Equip. Co., Chicago, Ill.
Reeder, Donald G., Chicago Pneumatic Tool Co., Kansas City, Mo.
Reedy, Fred O., Kennedy-Van Saum Mfg. & Eng. Corp., New York, N. Y.
Reynard, J., The Loomis Machine Co., Tiffin, Ohio.
Richards, Jess, Link Belt Co., Philadelphia, Pa.
Riggs, C. A., The Loomis Machine Co., Tiffin, Ohio.
Riordan, C. C., Jaeger Machine Co., Chicago, Ill.
Roberts, B. J., Deister Machine Co., Ft. Wayne, Ind.
Robins, Morgan E., Robins Conveying Belt Co., New York, N. Y.
Robins, Samuel Davis, Robins Conveying Belt Co., New York, N. Y.
Rockwood Nathan C., *Rock Products*, Chicago, Ill.
Ruddy, Thomas A., Stephens-Adamson Mfg. Co., Chicago, Ill.
Ruhloff, F. C., Bucyrus-Erie Co., South Milwaukee, Wis.
Runkle, Karl H., General Electric Co., Schenectady, N. Y.
Russell, S. R., DuPont Co., Wilmington, Del.
Ryan, Alfred E., West Process Pavement Co., Louisville, Ky.

Saadi, John J., Trojan Powder Co., Chicago, Ill.
Schwarz, F. H., Huron Industries, Inc., Alpena, Mich.
Schade, R. M., Allis-Chalmers Mfg. Co., St. Louis, Mo.
Schaub, H. W., Allis-Chalmers Mfg. Co., Toledo, Ohio.
Schermer, F. J., Armstrong Mfg. Co., Waterloo, Ia.
Schifflin, A. K., Link-Belt Co., Chicago, Ill.
Schirmer, G., Blaw-Knox Co., Chicago, Ill.
Seippel, Geo., Illinois Powder Mfg. Co., St. Louis, Mo.
Shield, W. L., Peerless-Union Explosive Corp., Pittsburgh, Pa.
Shores, Geo. W., Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Shotton, Bruce G., Hendrick Mfg. Co., Pittsburgh, Pa.
Shugg, L. W., General Electric Co., Schenectady, N. Y.
Smith, H.H., American Tar Products Co., Pittsburgh, Pa.
Smith, J. L., Fate-Root-Health Co., Plymouth, Ohio.
Smith, J. R., Taylor-Wharton Iron and Steel Co., St. Louis, Mo.
Srodes, H. B., Trojan Powder Co., Chicago, Ill.
Stewart, W. W., Koppel Industrial Car & Equip. Co., Pittsburgh, Pa.
Sullivan, Ralph C., *Rock Products*, Chicago, Ill.
Swanson, C. W., Illinois Powder Mfg. Co., St. Louis, Mo.
Taggart, Eugene B., McLanahan & Stone Corp., Hollodaysburg, Pa.
Tate, M. K., Ohio Power Shovel Co., Lima, O.
Taylor, John C., Jr., Taylor-Wharton Iron & Steel Co., Easton, Pa.
Taylor, Wm. F., Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Tennant, P. C., The Texas Co., New York City.
Thaleg, O. E., Traylor Eng. & Mfg. Co., Chicago, Ill.
Thaon, L. C., PIT AND QUARRY, Chicago, Ill.
Thomas, J. P., Keith Dunham Co., Chicago, Ill.
Tucker, R. S., The Good Roads Machinery Co., Kennett Square, Pa.

Ungar, Frank B., Ludlow-Saylor Wire Co., St. Louis, Mo.

Walsh, John K., Hercules Powder Co., St. Louis, Mo.
Ward, Arthur T., Productive Equipment Corp., New York City.
Watkins, R., Illinois Powder Co., Kansas City, Mo.
Webster, Edward, Ross Screen & Feeder Co., New York, N. Y.
Welch, F. M., F. M. Welch Engineering Service, Inc., Greenville, Ohio.
Welch, John J. Deister Concentrator Co., Ft. Wayne, Ind.
Wells, Fred S., Stephens-Adamson Mfg. Co., New York City.
West, W. C., West Process Pavement Co., Louisville, Ky.
Westenhaver, John L., Productive Equipment Corp., Chicago, Ill.
Westland, W. N., Marion Steam Shovel Co., Wollaston, Mass.
Williams, R. A., Amer. Car & Foundry Co., St. Louis, Mo.
Wills, Roy K., The Ohio Power Shovel Co., Lima, Ohio.
Wilson, Earle R., Marion Steam Shovel Co., Marion, Ohio.
Withey, M. W., Trojan Powder Co., Chicago, Ill.
Witt, A. O., Schramm, Inc., West Chester, Pa.
Wolf, Edwin, Du Pont Co., Narberth, Pa.
Woodford, F. E., The Woodford Engineering Co., Chicago, Ill.
Woodhull, M. J., Bucyrus-Erie Co., South Milwaukee, Wis.
Wyse, F. O., Bucyrus-Erie Co., Milwaukee, Wis.

Yoakley, W. R., Macasphalt Corp. of America, New York, N. Y.
Zinkgraf, J. W., Chicago Pneumatic Tool Co.

Guests

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Ahearn, V. P., National Sand and Gravel Assn., Washington, D. C.
Anderson, Mrs. Wm. A., Buffalo, N. Y.
Andrews, F. L., Wm. Penn Hotel, Pittsburgh, Pa.
Ashcroft, Mrs. Jerome L., St. Louis, Mo.

Bakstad, J. R., Jeffrey Mfg. Co., Columbus, O.
Barnes, Charles W., Jr., City Hall, St. Louis, Mo.
Beisber, Mrs. M. F., Evanston, Ill.
Beam, Mrs. C. C., Melvin, Ohio.
Bent, J. R., Illinois Agricultural Assn., Chicago, Ill.
Billman, Mrs. H. E., St. Louis, Mo.
Blakeslee, Mrs. Albert D., New Haven, Conn.
Bolton, W. W., Columbia Prod. Co., Barberton, Ohio.
Brockman, Mrs. H. J., Illinois Powder Mfg. Co., Memphis, Tenn.
Brooker, Edwin, Commerce Counsel, Washington, D. C.
Bunn, Geo. M., Clinton Motors Corp., Reading, Pa.
Bussen, Albert J., Bussen Quarries, Inc., Jefferson Barracks, Mo.
Bussen, Sylvester L., Bussen Quarries Co., Jefferson Barracks, Mo.
Butterworth, A. C., General Material Co., St. Louis, Mo.
Busse, Prof. A. C., New York University, New York City.

Cameron, W. H., Dolomite, Inc., Cleveland, Ohio.
Cange, C. J., 7015 State St., East St. Louis, Ill.
Carlson, Count Anton, Anderson & Dahl, Sweden.
Cooke, Mrs. Florence P., Swampscott, Mass.
Clayton, J. B., Jr., City Hall, Webster Groves, Mo.
Crocker, Mrs. John, 2701 Olive St., St. Louis, Mo.

Cullinan, H. J., Petroleum Iron Works Co., Houston, Tex.

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Dunn, Mrs. W. O., Cleveland, O.

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Eschenberg, N. J., St. Louis Material and Supply Co., St. Louis, Mo.
Eyermann, Mrs. W. J., St. Louis, Mo.
Ezlemeyer, E. E., American Pulverizer Co., St. Louis, Mo.

Fallon, J. W., 1465 Goodfellow Blvd., St. Louis, Mo.
Farber, N. G., Mich. Limestone & Chem., Buffalo, N. Y.
Fehlig, J. Frank, Fehlig Construction Co., St. Louis, Mo.
Fehlig, Mrs. J. F., Webster Groves, Mo.
Ferry, Seneca T., Washington University, St. Louis, Mo.
Fiala, Fred, Jr., Van Orman's Quarry, Hartshorn, Okla.
Franz, Mrs. Dorothy, St. Louis, Mo.
Freese, S. W., Hawley, Freese and Nichols, Ft. Worth, Tex.

Gallagher, C. V., Dolomite, Inc., Maple Grove, Ohio.
Garrel, Carolyn, Washington University, St. Louis, Mo.
Gilmore, John F., Boston Trap, Boston.
Goldbeck, Mrs. A. T., Washington, D. C.
Gonnerman, H. F., Portland Cement Assn., Chicago, Ill.
Gray, Bernard E. Asphalt Institute, New York City.
Gruendler, Wm. P., Wm. P. Gruendler Crusher and Pulverizer Co., St. Louis, Mo.
Graham, Mrs. R. L., Illinois Powder Mfg. Co., St. Louis, Mo.
Guitteau, Wm. B., Collector of Internal Revenue, Toledo, O.
Guitteau, Mrs. Wm. B., Toledo, O.
Gundlach, Geo. C., Board of Public Service, St. Louis, Mo.

Hall, Miss Rene, St. Louis Quarrymen's Association, St. Louis, Mo.
Harrison, S. T., Auxvasse Quarry Co., Auxvasse, Mo.
Hedderich, H. F., Westinghouse Elec. Mfg. Co., St. Louis, Mo.
Hemphill, Mrs. R. A., Trenton, S. C.
Henry, E. A., Webb City Foundry Co., Webb City, Mo.
Hermann, C. E., Reliance Whiting Co., Alton, Ill.
Holden, Thomas S., F. W. Dodge Corp., New York, N. Y.
Huegerich, Roy E., Washington University, St. Louis, Mo.

Jackson, Mrs. J. H., Carbon Limestone Co., Youngstown, O.
Jamison, Mrs. T. R., Camak, Ga.
Jens, S. W., Washington University, St. Louis, Mo.
Johann, Mrs. H. A., Chicago, Ill.
Johnson, John, Washington University, St. Louis, Mo.
Johnston, Mrs. H. A., Lebanon, Ohio.
Juett, J. P., O. B. Avery Co., St. Louis, Mo.

Kieffer, Mrs. W. T., St. Louis, Mo.
Killen, Chas., The Lima Stone Co., Lima, Ohio.
Killen, Mrs. Chas., Lima, Ohio.
Kilpatrick, Mrs. H. R., St. Louis, Mo.
Kratky, Robert, St. Louis, Mo.
Krause, Mrs. E. J., St. Louis, Mo.
Krause, Mrs. H. C., St. Louis, Mo.
Krause, Miss Louise, St. Louis, Mo.

Langston, Mrs. K. G., St. Louis, Mo.
Lane, Mrs. A. S., Meriden, Conn.
Lattimore, M. S., Mo. State Highway Dept., Macon, Mo.
Lendall, H. N., Rutger University, New Brunswick, N. J.
Linge, Harold, Donds Stone Co., Donds, Iowa.
Lumsden, Mrs. A. W., Pembroke, Va.

Manahl, Mrs. Herbert, Dubuque, Ia.
MacLachlan, Mrs. Thomas, New York, N. Y.
McCarty, M. F., International Harvester Co., St. Louis, Mo.
McClelland, Mrs. Anna P., Pittsburgh, Pa.
McCullough, Mrs. J., St. Louis, Mo.
McDonough, M., Malden Crushed Stone Co., Malden, Mass.
McKesson, C. L., American Bitumuls Co., San Francisco, Cal.
McGuire, D. D., Nat'l Sand & Gravel Ass'n., St. Louis, Mo.
McKinney, Mrs. B. A., West Roxbury, Mass.
McLean, M. E., McLean Stone Co., Nashville, Tenn.
McLean, R. E., E. St. Louis Stone Co., East St. Louis, Ill.
McLean, Mrs. R. E., East St. Louis, Ill
McThenia, Mrs A. W., Alderson, W. Va.
Meyer, Mrs. R. W., St. Louis, Mo.
Millen, H. E., Donds Stone Co., Donds, Iowa.
Munsch, Albert A., U. S. Bureau of Mines, Pittsburgh, Pa.

Neubrit, J. V., N. Y. C. Railroad, New York, N. Y.
Nichols, R. D., Jeffrey Mfg. Co., Columbus, O.
Norton, Mrs. F. C., Boston, Mass.
Nyberg, Prof. E. E., New York University, New York City.

Phillips, Mrs. S. A., Chicago, Ill.
Playford, Charles H., Washington University, St. Louis, Mo.
Pugsley, W. E., Missouri State Highway Commission, Webster Groves, Mo.

Quigley, Thos. J., Commonwealth of Pennsylvania, Bloomsburg, Va.

Rigg, Mrs. J. A., Alderson, W. Va.
Robertson, Mrs. John F., Princeton, Ky.
Robie, Theodore M., Fairbanks, Morse & Co., Chicago, Ill.
Rowen, E. P., N. Y. Rubber Corp., Chicago, Ill.
Rudder, S. M., State Highway Department, Webster Groves, Mo.
Rudder, Mrs. S. M., Webster Groves, Mo.
Russell, H. J., Jointa Lime Co., Glens Falls, N. Y.
Ryan, J. H., Ryan Quarries, Inc., Albion, N. Y.

Schirmer, Mrs. G., Chicago, Ill.
Schroeder, Vincent H., City Hall, St. Louis, Mo.
Scott, Jack V., National Safety Council, Chicago, Ill.
Seitz, J. E., Alemite Co., St. Louis, Mo.
Seitz, Frank, Washington University, St. Louis, Mo.
Seitz, L. H., Alemite Co., St. Louis, Mo.
Skrainka, Mrs. W. J., St. Louis, Mo.
Smutz, Harold T., City Hall, St. Louis, Mo.
Sparks, Mrs. W. C., Princeton, Ky.
Sporborg, Mrs. W. L., Syracuse, N. Y.
Staplin, L. D., Carbonite Metal Ltd., Chicago, Ill.
Staplin, L. E., Carbonite Metal Co. Ltd., Chicago, Ill.
Stevens, Robert, Connecticut State Highway Dept., Hartford, Conn.
Steele, Varian, Timken Roller Bearings Co., St. Louis, Mo.
Stinson, Geo. H., Washington University, St. Louis, Mo.
Swanson, Mrs. C. W., St. Louis, Mo.
Swasey, Spencer S., Walter A. Zelnicker Supply Co., St. Louis.

Thoenen, J. R., U. S. Bureau of Mines, Washington, D. C.
Thompson, Mrs. Jas. R., Frankfort, Ky.
Thompson, Mark R., City Hall, St. Louis, Mo.
Thompson, Jas. R., Blanton Stone Co., Frankfort, Ky.
Thomson, H. F., General Material Co., St. Louis, Mo.
Torrance, Richard, Washington University, St. Louis, Mo.
Torrence, Mrs. A.
Travilla, Mrs. Jas. C., Pilot Knob Ore Co., St. Louis, Mo.
Truex, F. W., Bay City Truck Crane Co., Bay City, Mich.

Ungar, Elizabeth, St. Louis, Mo.
Ungar, Mrs. Frank B., St. Louis, Mo.
Upton, O. D., N. Y. Rubber Corp., Dallas, Tex.

Van Orman, C. E., Van Orman's Quarry, Hartshorn, Okla.

Walker, Stanton, Nat'l Sand & Gravel Ass'n., Washington, D. C.
Weber, Mrs. John E., Stolle Quarry and Construction Co, East St. Louis, Ill.
Wheeler, W. H., Washington University, St. Louis, Mo.
Williams, Harold, Boston, Mass.
Wilson, Mrs. H. G., St. Louis, Mo.
Wilson, Jean, St. Louis, Mo.
Wrey, Robert B., Washington University, St. Louis, Mo.
Wolffe, Fred, Ass't City Engr., University City, Mo.

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The Effective Management of Credit in the Crushed-Stone Industry

By WM. E. HILLIARD
General Manager, New Haven Trap Rock Co.

NINETY-FIVE per cent of all business to-day, it is estimated, is done on credit, and only five per cent on the basis of cash. The ratio of credit business to cash business is, therefore, about nineteen to one.

It is estimated, by competent observers, that the total volume of business in this country in a recent calendar year was six hundred thousand times one million dollars, a sum so vast we fail readily to grasp what it means. Imagine a city like Newark, N. J., and its suburbs, with about 600,000 inhabitants, and then try to picture every man, woman, and child in that great city each having one million dollars apiece, and it will help to visualize that enormous sum; and then consider that it would only represent one year's business in this country, and about nineteen-twentieths of all that business is done on credit. Credit is, therefore, the very foundation of our whole modern business structure; and one of the foundations of the modern civilization in which we live and whose benefits and advantages we enjoy. In the brief time which we can give to this broad topic to-day, it is necessary to present it only in outline. We propose, therefore, first to discuss briefly some of the general aspects of credit, and then finish with some conclusions about credit in our own crushed-stone industry.

What is credit?

One of our best modern dictionaries gives sixteen definitions of the word "credit," but none of them seem quite comprehensive and definite enough for what we mean by credit in business to-day. It is commonly considered that the best definition yet made was one worked out by a well-known authority on the subject a few years ago. Here it is:—

"Credit is the power to obtain money, goods, or service by giving in exchange a promise to pay at some definite future time."

The principle, therefore, is just the same whether you borrow money on a note at the bank; or buy a bill of goods on thirty days credit; or purchase professional services of a lawyer or physician, or obtain electric light or telephone service to be paid for at a definite future date.

Classes of Credit

There are four classes of credit: (1) Investment credit; (2) banking credit; (3) wholesale credit; (4) retail credit.

Investment credit is a long time proposition and is outside of our discussion to-day. It involves the investing of capital on the basis of earning dividends or interest, to be paid at intervals for a long period of time; whereas, in the other three classes of credit, the purpose is to make one transaction which nets one definite profit.

Banking credit, of course, concerns the use of money itself, and has much in common with wholesale and retail credit; and most of what we have to say to-day applies to banking credit as well.

The other two classes—wholesale credit and retail credit—are sometimes lumped together under the term of mercantile credit, or sometimes as commercial credit. We are interested to-day, particularly, in these two classes. Please note the distinction between the two. Wholesale credit is the credit used when goods are sold by one firm or individual to another for the purpose of resale. Retail credit is the credit used when the sale is made directly to the ultimate consumer. We often think of wholesale credit as being on a large scale and retail credit as being on a small scale, but the principle involved is not concerned at all with the size of the sale. A wholesale grocer sells a few cans of canned vegetables to a retail dealer on a special order and it is a wholesale credit proposition, although the sale may be much less than one dollar. A department store may furnish and equip almost completely a large new house with all the carpets, furniture, dining room and kitchen equipment, amounting to several thousand dollars, but it is a sale based on retail credit because the sale is made directly to one ultimate consumer. Of course, in the long run, the average size of each sale is very much greater in wholesale business than in retail business.

The Three C's

It is an axiom in wholesale credit circles that credit is granted on the basis of the three "C's", which are:—

Character, capacity, capital.

Please note the order in which these three factors are stated. Character is placed first because there is no doubt that character is the most important single factor in granting credit. If you are a wholesale hardware dealer, and are considering an order from a retail hardware dealer whom you have not sold before, first of all you want to know what kind of a man he is. Has he the reputation of being overshrewd, tricky and uncertain, inclined to find loopholes in any contracts he makes and inclined to go very close to the extreme legal limits in transactions even if he doesn't sometime overstep the limit; or is he a man who stands morally four-square to the world, whose word is as good as his bond and who will pay his honest debts if it takes his last dollar. What kind of a man is he?

Under the play of emotions across the faces of our fellowmen—the expressions which we have come to interpret as meaning rage, delight, disgust, approbation, apathy, enthusiasm and the like,—beneath all this lies the real character of the man him-

self. In the long run, a man comes pretty near being just about the kind of man he is thought to be by a group of his fellow-men who have known him well for a long time. Mistakes are sometimes made. Sometimes we are shocked when some man whom many of his fellows have considered to be moral and upright in every way, does something reprehensible and we feel we have all been mistaken in sizing him up. On the other hand, sometimes, a man whom many of us have not rated any too highly suddenly displays in some crisis of his business or personal or community life, such sterling qualities that we have to say that he is a good deal more of a man than we thought he was. These, however, are exceptional cases; in the long run, the combined opinion of his fellowmen who have known him well is pretty apt to size a man up for just about what he really is.

What is character, anyway?

The best definition I have ever found is this:— "Character is the sum-total of all the decisions a man has made during his entire life." That covers, you see, decisions not only on moral questions, but on questions of ordinary judgment and common sense where no moral responsibility is concerned. For in all this discussion about character, please remember that we are not concerned simply with a man's honesty. Most men are honest. Our whole system of business and of government, and in fact our whole economic and social structure is based on the assumption that most people are honest and that only a small minority are dishonest. Of course we need to know about a man's honesty, first of all; but in sizing up his character, we need to go much further and consider, for instance, whether or not he possesses courage, stability and fortitude under strain and stress. More money is lost in this country every year by business failures of men who are inherently honest, but who lack some of the other qualities which a business man must possess, than is lost by all the cases in which commercial dishonesty is involved.

Some of the older of you may recall the investigation of the so-called "money trust" in New York City many years ago. J. Pierpont Morgan, the elder, was called as a witness. Mr. Morgan's testimony on the stand was substantially as follows: The chairman said, "Mr. Morgan, do I understand you to say that character is of vital importance when granting credit? Do you mean to say that you would consider loaning one million dollars to a man on the basis of his character?" Mr. Morgan replied:— "I not only would, but I have, and more than once, and it was always repaid. In the long run, character is the finest asset there is for granting credit."

Capacity and Capital

Capacity is also important. If you are a wholesale hardware dealer considering the case of a prospective retail hardware dealer as a customer, you want to know whether he knows his line or not. Does he know how to buy and how to sell, how to hire, train and develop competent and loyal assistants, how to select stock, collect money, adapt himself to the changing tides of business and make his business pay. Lack of capacity has probably caused more business failures than any other one single factor, such as lack of adequate capital or financial depressions and the like.

Capital is of course always an important factor in credit granting in wholesale business. We need to know two things about capital. First, how much capital does the customer possess and second, how it is related to his business. If one retail hardware dealer has an invested capital of $25,000 and another dealer has $50,000, other things being equal, of course one man is twice as strong as the other in point of invested capital. In some cases, however, a man with $25,000 may be running a small snug business very efficiently, making a living for himself and his family and making some financial headway; while a man with $50,000 may be trying to do a business three or four times as big as the first man's, may have to borrow at the banks considerably more than usual seasonal borrowings and may not be making any financial headway at all. To get the right picture then, we must find out both the amount of capital a man has and how it is related to the needs of his business.

Skill in wholesale credit management comes from learning to handle these three factors in their proper perspective. Of course when a man rates high in character and capacity and capital, there is no problem. Any office boy would know that such a man should be sold as much as possible. If a man rates low in character and capacity and capital, once again any office boy should know that such a man should not be sold anything at all on a credit basis. But when it comes to the great bulk of credit granting in between these two extremes, it is not always an easy task to know just how to estimate each customer properly. For instance, a man may rate high in character, high in capacity and low in capital. Is he a good risk or not? Each case has to be determined on its own merits but quite often such a case as this would be worthy of credit. A man who has both character and capacity is pretty sure to accumulate capital after a time, barring some accident or misfortune. Many young business men starting out with excellent character, with capacity developed by working for someone else, but with little capital of their own, eventually make good and become valuable and loyal customers for those wholesalers who have extended them credit at the start.

Suppose a man is rated high in character, low in capacity and high in capital. What sort of a risk is he? You cannot always tell until you have investigated thoroughly, but quite often such a case is a good risk. A man with character will pay his honest debts if it takes his last dollar. In this case, the man is rated high in character and has adequate capital, so that even if his business did not result successfully after a reasonable time, the loss would come out of him, rather than out of his creditors. The fact that his capacity is rated low may mean that he is a young man who has not had much chance to develop capacity. Furthermore, assist-

ants with excellent capacity frequently may be hired so that the weak spot in this man's business may be covered reasonably well. Of course you understand a low rated capacity is a serious handicap and may be serious enough to cause you to turn down the credit application.

Of course in cases where character is rated low, it is dangerous to sell under any conditions. Possibly a man who rates low in character, high in capacity and high in capital may be considered if he needs a line of goods which the seller is very anxious to move and is finding hard to sell; but if the seller makes the sale he must remember that he is entering into a contest of wits and that the buyer is likely to endeavor to evade payment by any legal loop-hole that can be found in the contract or the bill of sale. Almost always such a case should be sold for cash only.

I have only scratched the surface of this topic of the three C's, but I have said enough to indicate to you what an enormous variety of credit risks may be found in varying combinations of these three different factors, each of which may rate anywhere between very high and very low.

Retail Credits Defined

We come now to the question of retail credits. It is commonly stated that credit is granted in the retail business on the basis of two factors which are: (1) The customer's will to pay. (2) The customer's ability to pay.

A little reflection will indicate that the will to pay in retail credit corresponds closely to the element of character in wholesale credit granting; and ability to pay in retail credit depends upon income rather than capital, whereas in wholesale credit we are concerned with capital primarily and not so directly with income itself. The question of capacity which is a factor in wholesale credit, is not a direct factor in retail credit granting.

Retail credit is much more a man-to-man affair than wholesale credit. The buyer and the seller are in more direct personal contact. The credit man in a retail establishment needs to have a particular ability to size up people from personal interviews and to depend somewhat less on records and information and somewhat more on personal intuition than is the case in wholesale credit.

What we want to know about a retail customer is some definite information about his income, whether he obtains it as salary or wages, or whether he obtains it as dividends or interest on investments. Also we want to know what his habits of payment are.

Crushed-Stone Credit

Having briefly outlined credit in general, let us now consider it in the crushed-stone industry.

Credit problems vary greatly among crushed stone producers. Some concerns no doubt sell mainly at wholesale, while others sell mainly at retail. Some may have a few large customers who take all their product while other quarries of similar size and production may dispose of all their product by local truck deliveries to a very large number of customers, each of whom buys only a small quantity at a time.

Probably the great majority of the producers sell partly at wholesale and partly at retail. It is evident then that credit problems in our business cover a wide range; those problems in the case of anyone of those producers may differ greatly from those of his fellow producers in another territory or even in the same territory.

In our business of furnishing materials, we have in our different states varying degrees of protection under lien laws or rights to file claims within a limited period such as within sixty days after date of the last delivery. In some states there is very little protection to the material man. In other states there is partial protection; and in still other states protection has been made reasonably complete. In these latter cases, it is part of a state highway contract that the contractor has to pay in full for all labor and materials furnished on that particular contract for the state, and if he fails to do so, the bonding company is responsible.

Under these conditions, a producer may sometimes find that he would be justified in selling a certain contractor in a State where the protection is reasonably complete on State Highway work, while in a neighboring state, where the protection is less adequate, the same contractor would fall a little short of being a reasonably good risk.

Sound business consists in taking reasonable credit risks. Each credit problem must be worked out to determine whether it is a reasonable risk or not. The old adage states, "Success is usually won only at the risk of failure." That certainly applies to credit management. While risk may sometimes be kept down to a limited degree, nevertheless some element of risk is of course unavoidable. We must endeavor, therefore, to take no unwarrantable risks and yet on the other hand, must be willing to accept reasonable business risks when necessary. We can be too rigid in granting credit and by trying hard to avoid any bad debt losses whatsoever can curtail our volume of business so much that we will not make the profit that year which we ought to make, even though we lose practically nothing in the way of bad debts. On the other hand, we can grant credit too loosely for the sake of obtaining the utmost volume and incur credit losses which will more than nullify any advantage gained by the additional volume.

For most of us a reasonable middle course between these two extremes is the best and the most profitable in the long run year after year.

Credit Agencies

As long ago as about 1850, The R. G. Dun Co. and the Bradstreet Co. began to operate as mercantile credit agencies, furnishing commercial ratings on firms and individuals in business. That information was based on financial statements in regard to capital, with some added information about income and profits when such information could be obtained and further information about the character and capacity of the subject. These two agencies were

the first in America in their line and are still the two most important to-day.

In addition, there have sprung up among various trade groups credit bureaus to provide credit information for their members in their particular line of business. These bureaus were made up of wholesalers in the same line of business who pooled their information about retailers to whom they sold.

One of the most significant movements in recent years in credit management has been the remarkable development of credit interchange bureaus not limited to any one particular line, but serving a certain territory. Under the auspices of the National Assn. of Credit Men, 77 wholesale credit bureaus were established in different parts of the United States. The members of these credit bureaus are mainly manufacturers, wholesalers and jobbers, who report lists of their customers to the bureau. Each member of a bureau has a designating number such as 7, 12, 19, etc. Each customer's card has numbers entered on it eventually, which numbers represent all the firms who report that they have done business with that customer. In the Connecticut bureau, for instance, there may be a card for Henry Williams of Torrington, Conn., and on his card will appear numbers which might be 7, 12, 19, 25, 31, 47. Those six numbers indicate that six different members of the bureau have sold that customer. If some member of the bureau sends in an inquiry about Henry Williams, clerks in the bureau office check these numbers from his card and either by mail or telephone, learn from the credit departments of the six concerns indicated by number, their present ledger record and recent experience with this party. When the returns are all in, the inquirer gets a tabulated report of all this information, without knowing the identity of any of the firms who turned in the information. Furthermore, each one of those firms who supplied anything to the report, automatically gets a copy of the completed report from the Bureau. You can readily see how this reciprocal system, when fully carried out, aids the Bureau members in knowing when some customer or prospective customer is not paying his bills elsewhere promptly. It also makes it much more difficult for an occasional commercial crook to buy at the same time from a large number of different stores many times the amount of merchandise he usually carries, then cash in as much of it as he can quickly and leave hastily for parts unknown without paying his bills.

In retail credit in recent years, there has been a sudden growth of local retail credit bureaus throughout the country, more than 1,000 of them being in operation to-day. These are particularly helpful to their members on account of their quick service, because retail credit often has to be granted quickly without the time to investigate which is often possible in wholesale credit.

In the New Haven Retail Credit Bureau, operated by the chamber of commerce of New Haven, which bureau serves New Haven and immediate vicinity, we have on file over 200,000 individual cards. Six trunk line telephones are in operation daily. If a member of the bureau such as a local jeweler or shoe dealer or department store wishes to know about some prospective buyer, they can call up the credit bureau and while they hold the wire, they will be given a brief statement about what information is on file regarding that customer, if the customer already has a record in the bureau. If he has no record, the bureau will endeavor to obtain information to start one. The Bureau will run down quickly by telephone any references the store may transmit to it, which references have been given by the prospective buyer. With a little more time, the bureau will check up the applicant's business connections in reference to salary or wages earned if he or she is employed somewhere. If the applicant has recently moved to New Haven from another city, or district covered by a local bureau such as Springfield, Mass., or Syracuse, N. Y., the New Haven Bureau will communicate by mail or possibly by telephone with that other bureau and through this reciprocal method, frequently can learn a good deal about the applicant.

These retail interchange bureaus can aid their members to determine the proper rating of the applicant's "ability to pay," and "will to pay." The wholesale interchange bureaus can aid their members to determine the proper rating of the applicant as to "Character, Capacity and Capital."

Some producers in our line may now be making use of either such wholesale credit bureaus or retail credit bureaus as may be located in their territory. Others who have not followed up the work of these bureaus in recent years may be interested to investigate and see if they could not profit by joining them. These bureaus in the last few years have become vastly more efficient than they were even a few years ago.

The time has apparently not yet come when any organized bureaus would be effective in our industry alone. It is possible that in the future our industry may follow the practice of some other industries, where the need for bureaus is no doubt greater, and find it possible to do something in this line. Of course many individual producers have coöperated on friendly terms with their competitors by exchanging occasional items of credit information in an informal fashion.

I presume all of us present at this meeting today who take any part in credit granting have had the experience of sometimes letting some of our competitors know about customers of ours who have suddenly gotten in bad shape financially; and conversely many of us have had the experience of receiving occasional items of information from other producers so that when a certain customer came to buy from us, we knew in advance that his only reason for coming to us was because he had been shut off somewhere else for not paying his bills. Among all the other activities of our local and national crushed-stone associations it may be possible in the future to develop this informal assistance to one another into more definite, concrete and organized form through central bureaus.

On the other hand it may be that in the future

we can do better to join some of the bureaus already established which would have reports about our prospective customers not simply from other stone producers, but from many other lines of business as well, such as cement, steel, asphalt, contractors outfits and the like. In either case, I believe we are likely to see credit handled far more scientifically in the future than has been possible up to the present time.

There are two considerations we should bear in mind when granting credit in our line. In the first place, when we refrain from granting credit to those prospective customers whose records show that they are not worthy of credit, we are aiding the industry in general by improving the whole pattern and fabric of our business methods. In the second place, it is not fair that those customers who are sound credit risks and who pay their bills with reasonable promptness and regularity should have to compete with unsubstantial and unreliable customers any more than is absolutely necessary. If we are too lax in credit granting, we are only encouraging these undesirable customers to continue in business where they have no real right to be and from where it is only a question of time when they will be ultimately forced out.

We saw at the beginning of our talk to-day that "Credit is the power to obtain money, goods, or service by giving in exchange a promise to pay at some definite future time."

We should try to see that such real, undoubted power be not bestowed by us to unworthy customers; but that it *be* supplied to those sound and dependable customers of ours on whom the final success of our business depends, in the long run.

Crushed-Stone Convention Delegates Appreciate Entertainment

That the entertainment features during the St. Louis convention of the National Crushed Stone Assn. were fully appreciated by the delegates, members and guests was constantly evident. Everyone was enthusiastic about the splendid functions that had been arranged and financed exclusively by the operators and manufacturers of the St. Louis district, under the able leadership of E. J. Krause, president and general manager of the Columbia Quarry Co., who served as chairman of the entertainment committee, and of Maj. Edmund J. McMahon, executive secretary of the St. Louis Quarrymen's Assn., who served as chairman of the reception committee. These men gave their time and efforts liberally and their results showed in the exceptionally high character of the numerous nontechnical functions of the convention's duration.

That these gentlemen felt rewarded for their efforts was well expressed in their own words which appeared in the final daily bulletin, as follows:

"On behalf of the St. Louis Quarrymen's Assn. and all the nearby Missouri and Illinois quarrymen, we desire to acknowledge and express the great pleasure it has been to have you with us.

"Your selection of St. Louis as the 1931 convention city did us much honor, and it has been both privilege and pleasure to meet you again. We are extremely appreciative of your own reception of our efforts to receive and entertain you, and particularly at your gracious comment.

"It is only fair we advise you of the volunteered coöperation we had from several powder companies, and we know we voice them your appreciation as well as our own.

"It is with much regret we contemplate your departure, tempered only by the hope we may have you with us again very shortly."

E. J. KRAUSE,
Entertainment Committee.
E. J. MCMAHON,
Reception Committee.

Frequent Inspection of Machinery Pays Real Dividends

While inspecting an Ohio aggregate plant recently, a PIT AND QUARRY editor noticed a badly damaged cast-iron sheave lying on the ground near the tipple. Upon further examination it was found to be completely broken down on one side. "That was pulled out of our primary crusher the other day," said the superintendent. "We knew it fell out of one of the cableway pulleys into the pit, and for several days I had three men stationed on the conveyors and scalping screens looking for it to come through. All of a sudden the big crusher stopped with a jerk throwing the belt off of the driven pulley, and there it was!"

Fortunately, the damage amounted to but the loss of the three men's time and the pulley with its necessary replacement cost. Had the belt pulley been tight, the chances for a large repair bill on the crusher castings would have been good, not to speak of the loss of time and money incident to a complete plant shutdown while waiting for repairs and new parts.

Obviously, the remedy for incidents such as these is the strict adherence to a policy of thorough periodical inspection of all mechanical equipment of the plant. This applies not only to the production equipment, but to the trucks, bins, pumps and other items of equipment likely to cause a plant shutdown in the event of their breakdown. In each plant in addition to their regular duties one or more men should be required to make these inspections thoroughly and regularly. Operators of truck fleets attribute the long life and economy in the operation of their equipment to the fact that certain men do nothing but inspect and service every truck at regular intervals. Similarly, railroads are known for their strict enforcement of equipment inspections. A locomotive on a cross-country train travels but a few hundred miles when it is replaced by another, to be inspected and oiled before returning to service.

More attention on the part of plant superintendents to inspection of plant equipment will soon pay large dividends in fewer plant shutdowns and longer life of the mechanical equipment.

A.R.B.A. Committee Favors Ready-Mixed Concrete for Road Building

Final Report Submitted at St. Louis Convention After Comprehensive Study

READY-MIXED concrete is entirely suitable for use in the construction of streets and highways, in the opinion of the Committee on Central- and Truck-Mixed Concrete of the American Road Builders' Assn., which met Thursday, January 15, at St. Louis as a part of the twenty-eighth annual convention and road show. A digest of the preliminary report appeared on page 54 of the Nov. 19, 1930, issue of PIT AND QUARRY.

The final report, submitted by the chairman, Col. R. K. Compton, director of public works, Richmond, Va., and the committee's investigator, P. F. Steward, assistant engineer of the association, was presented at the meeting. In substance, the report was as follows:

Ready-mixed concrete, with a production last year in excess of 7,000,000 cu. yd., is a method of construction which has come to stay. The term "ready-mixed concrete" as used in this report is taken to mean Portland-cement concrete mixed at a central-mixing plant and hauled to the job; or the aggregates proportioned at the plant and the product mixed at the plant in transit or at the job, in a truck mixer.

After reviewing the data on hand, this committee has arrived at the following conclusions:

1. Ready-mixed concrete, manufactured under proper supervision, is acceptable for all types of concrete construction.
2. The ready-mixed concrete plant should be equipped with weighing devices, meeting the specification of the American Road Builders' Assn. for weighing devices for concrete aggregates, and as used by various state highway departments.
3. For low-slump concrete, the non-agitating type of truck is satisfactory as hauling equipment under proper supervision and gradation of aggregates.
4. Specially-designed, water-tight bodies with rounded corners should be required when open-type dump bodies are used.
5. The so-called "agitator" type of bodies have proved satisfactory for hauling concrete of any slump under proper supervision and gradation of aggregates.
6. Satisfactory concrete can be secured by truck mixers, provided proper supervision and gradation of aggregates is exercised.
7. The use of central-mixing plants, the transportation of mixed concrete and the use of truck mixers may be permitted, provided there is no segregation of material when the concrete is deposited on the subgrade.
8. The concrete may be hauled not to exceed one hour, except by special permission of the engineer, and must reach the subgrade in such plastic and workable condition that the slump on the job is within the limits specified.
9. Any concrete which is not plastic and workable when it reaches the subgrade should be rejected.
10. It may be pointed out that there is generally a change of slump with the elapse of time after mixing. This should be taken into consideration in arriving at a suitable water-cement ratio applicable to each job. In this respect complete cooperation is necessary between the engineer and the operator.
11. The methods of transferring the product from the hauling unit and depositing same on the subgrade have been discussed as well as the protection of subgrades requiring such protection.
12. Where no mesh reinforcing is used, it is suggested that light steel channels be used for truck runways. These channels should be in sections preferably five (5) feet in length. Where reinforcing mesh is used, portable swivel type conveyors to take care of at least twenty (20) feet of subgrade could be utilized.
13. The use of bulk cement frequently presents an economic and—from an engineering standpoint—thoroughly satisfactory operation. However, the decision in this matter should be reached after an investigation as to the adaptability of the project to be constructed to such a method.
14. Engineers, in permitting the use of ready-mixed concrete, should at all times satisfy themselves that the operator is sufficiently equipped both from the standpoint of personnel and mechanical equipment to produce and deliver the product in sufficient quantity and of a quality which is acceptable.

In order to comply with the many requests being received from engineers, contractors, and manufacturers of equipment, the American Road Builders' Assn. conducted a survey to determine the extent to which ready-mixed concrete was being permitted in paving specifications, the results being obtained, along what lines improvement was needed, and in cases which the product was not permitted under the specifications, the principal objections to its use.

Accordingly a questionnaire was prepared containing the following questions:

1. Do you permit, under your specifications, the use of concrete mixed in a central-mixing plant?
2. Do you require the product to be agitated en route from the mixer to the job?
3. What is the maximum time allowed between mixing and placing?
4. Do you permit, under your specifications, the use of concrete mixed in transit?
5. Do you use the slump test for concrete?
6. If so, what is the maximum slump permitted for concrete for one-course concrete paving? For concrete base?
7. In case of reinforced concrete pavements, how is reinforcement handled so as to permit delivery units to back up along the grade to the point where concrete is to be deposited?
8. Do you experience difficulty with trucks cutting up subgrades?
9. If so, how is this overcome?
10. From your experience with central- or truck-mixed concrete, on what methods of construction or equipment are improvements needed?
11. If you do not permit the use of central- or truck-mixed concrete, what are your principal objections to same?

This questionnaire was then sent out to all state highway departments and to 102 cities selected at random over the country, usually two to each state.

That the use of this product is of unusual interest is evidenced by the fact that out of 150 questionnaires sent out, 103 replies were received, without a "follow-up" letter. Forty-two of the forty-eight states replied, and 61 of the 102 cities.

In many instances these replies were accompanied by a letter stating that the engineer was in no way familiar with the use of ready-mixed concrete, and requesting general information on same.

From the replies received, it is evident that in the majority of cases the engineer has failed to keep up with the developments of the ready-mixed concrete industry. In general, the engineer thinks of ready-mixed concrete in accordance with the experiences of 1918-1921. He views it as a product reaching the job in a segregated condition, at infrequent intervals, with no regard as to consistency, generally unsatisfactory, and an operation over which he cannot exercise the proper control.

However, a check of these unsatisfactory conditions, when ready-mixed concrete is being produced from a modernly-equipped plant, intelligently supervised, shows that they can and have been completely eliminated.

Of the 42 states replying, 23 permit, under their specifications, or under special provisions, the use of ready-mixed concrete; 16 do not, and 3 simply state that they have had no experience. Three, in the case of central-mixing plants, required the product to be agitated en route. The maximum time allowed between mixing and placing varies from 30 to 60 minutes, with the average being 40 minutes. The slump test is used in 30 of the 42 states. The maximum slump for one-course concrete pavement reported is 3.5 in., the minimum 1 in., and the average 2 in. For concrete base, 4 in. is the maximum, 1.25 in. the minimum, and 3 in. the average.

Of the 56 cities tabulated, 38 permit the use of ready-mixed concrete, 11 do not permit its use, and 7 state that they have had no experience with this method. The time allowed between mixing and placing varies from 10 to 60 minutes, with the average being approximately 45 minutes. The slump test is practically universally used, with the average slump for one-course concrete being 2 in. and for concrete base 3 in.

In view of the data collected on, and the experience of the members of the committee with ready-mixed concrete, there are 3 difficulties which must be given particular attention. These are as follows:

1. Damage to subgrade by hauling equipment.
2. Water control.
3. The transfer of the product from the hauling unit to the subgrade.

Damage to Subgrade

The damage to the subgrade by the hauling equipment presents a problem entirely different from that encountered when a mobile paver is used on the grade. Trucks hauling aggregates to a paver will, of course, damage certain subgrades just as ready-mixed concrete equipment will, but, in the case of a paver, the operator is given an opportunity to correct this damage immediately behind the mixer, and before the concrete is placed. However, in a ready-mixed concrete operation the concrete is dumped from the hauling unit direct to the grade and therefore the opportunity to fill the ruts caused by the hauling unit frequently is not afforded. Apparently, the most economical and satisfactory manner of correcting this condition is by the use of comparatively light channel irons. These irons are used as runways for the truck, and should be in sections preferably 5 ft. in length. By using as runways channels so constructed, the end section nearest the concrete can be removed, and brought forward, and thus eliminate moving ahead the entire runway.

Water Control

Water control and the transfer of the product from the hauling unit to the grade were given serious consideration. In order to get a consensus of opinion on these matters from engineers in general, a questionnaire was mailed out to all state highway departments and to the same cities as previously referred to, asking the following questions:

1. Could satisfactory results be obtained by the use of a conveyor for transferring the concrete from the hauling unit to the subgrade?
2. Could satisfactory results be obtained by the use of a chute for transferring the concrete from the hauling unit to the subgrade?
3. Could more satisfactory results be obtained by weighing the water rather than by the use of volumetric proportioning of same?

(Continued on page 66)

Georgia Fullers' Earth Plant Operates on Huge Scale*

By H. D. KEISER

At the right—A general view of the plant of the Attapulgus Clay Co. in Decatur County, Georgia.

FULLERS' EARTH, which was first used for "fulling" or removing grease from woolen goods and from which process it was named, is a variety of clay that has the property of removing basic colors from solution in animal, vegetable, and mineral oils. Petroleum refiners are the largest consumers of fullers' earth.

At Attapulgus, in Decatur County, Ga., the Attapulgus Clay Co., owned by the Atlantic Refining Co., and the Standard Oil Co. of New Jersey, has been mining fullers' earth since 1920 from a tract of several thousand acres. Operations of the Attapulgus company have trebled since their inception and, at the current rate of production, the deposit has an estimated life of 40 to 50 years.

The thickness of the deposit varies from 2 to 12 ft., averaging about 7 ft. Overburden ranges in thickness from a few to 50 ft. and averages about 35 ft. Open-cut mining methods are employed. Overburden removal, for safety and convenience of operations, is kept at least six months in advance of actual mining of the deposit. In the removal of overburden, a layer, 1 to 3 ft. thick, is left in place to protect the underlying clay from deterioration that results if the clay be permitted to weather.

When a pit is opened, a cut is made through the overburden with small dipper- or drag-type steam shovels. Removal of the overburden is then continued with 75- to 90-ton standard-gauge steam shovels of the railroad type, equipped with 2½- to 3½-cu. yd. dippers. Marion, Bucyrus, and Osgood steam shovels are used. Overburden is loaded by the steam shovels into 12-cu. yd. standard-gauge cars, which are moved to a dump by 60-ton steam locomotives. The dump is usually situated not more than a mile from the pit, and is formed by first constructing a temporary trestle about 40 ft. high, from which the cars of overburden are dumped. When the overburden material reaches the top of the trestle, the dumping track is moved laterally on the material, a fan-like shape being given to the dump as it is built up.

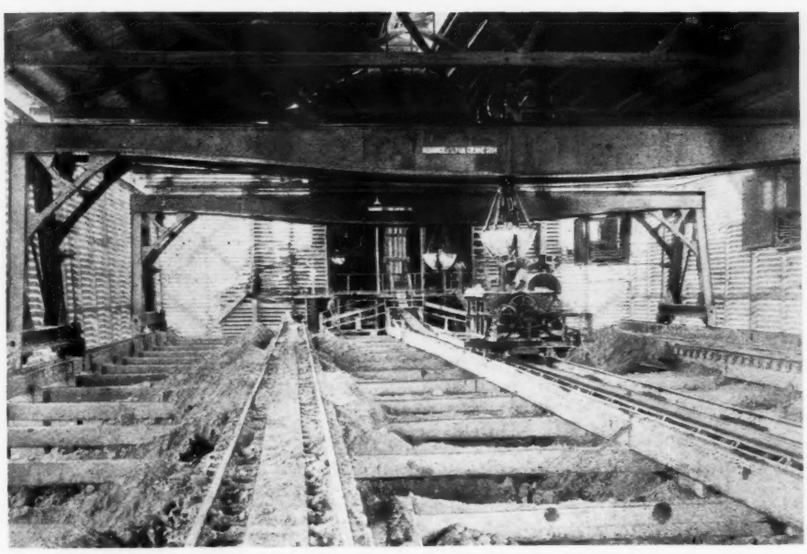
In mining the clay deposit, the protective layer of overburden is first removed, and the bank dynamited. This use of explosives makes the clay easy to handle and imparts to it an initial fracture that is desirable in subsequent treatment operations. In dynamiting, the practice is to drill a series of holes, 3 in. in diameter and 8 ft. apart, immediately ahead of steam-shovel operations. The amount of dynamite used varies with the thickness and hardness of the clay, the average charge being about 1½ lb. per hole.

* Reprinted from *Engineering and Mining Journal*, June 7, 1930.

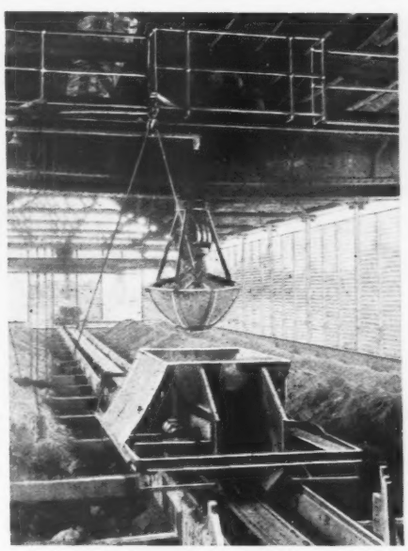
Two steam shovels on upper bench excavating overburden. The steam shovel on the quarry floor is loading fullers' earth.

The clay is loaded into 5-cu. yd. side-dump cars by means of Thew and Marion steam shovels, equipped with ⅝- to 1¼-cu. yd. dippers and caterpillar treads. Steam shovels of this small size are employed because of the shallow depth of the clay, and because a clean cut at the bottom of the deposit can be made with them. The comparative hardness of a sandstone that usually underlies the clay permits nearly all of the clay to be scraped up by the dippers of the steam shovels, without danger of contamination. Trains of 15 to 25 cars are hauled from the pit by small steam locomotives over a 36-in. gauge line to the wet-clay shed, where the clay, ranging in size from a fraction of an inch to 10 in., is dumped onto a drying floor. The locomotives weigh 21 to 30 tons and are of Porter, Baldwin, and Davenport manufacture.

The wet-clay shed has a capacity of 3,000 tons. It is 250 ft. long by 50 ft. wide, has lattice sides, and a storage depth of 15 ft. below the track level. After the clay has been air-dried for two or three days, ¾-cu. yd. orange-peel buckets, operated from two traveling electric cranes, load it into two distributors. The following motors are employed for each bucket-crane operation: dead line, 5 hp.; closing line, 15 hp.; carriage, 5 hp.; crane, 22 hp.



Wet-clay shed where the earth is air-dried before milling.



Loading distributor in wet-clay shed.

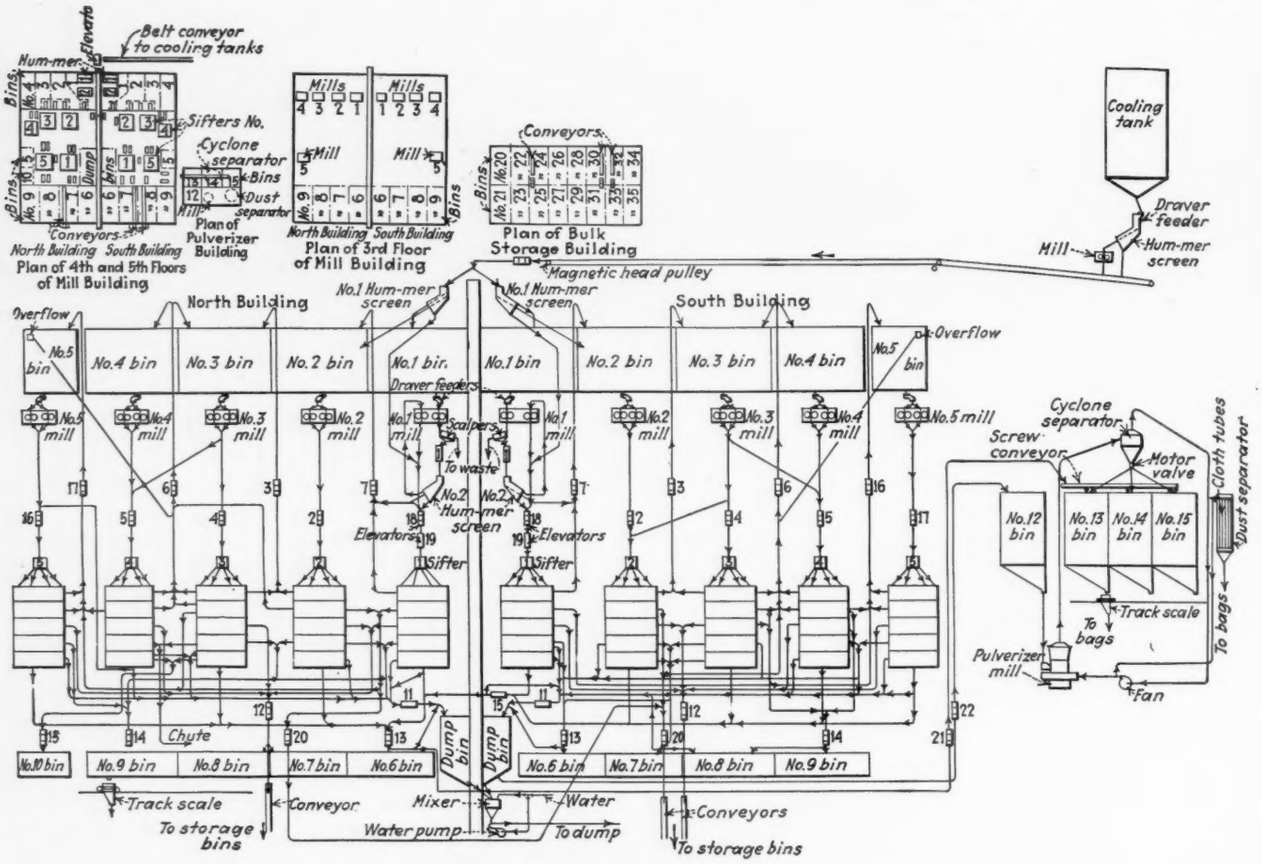
The distributors are portable. Each is equipped with a hopper bottom and a steel-plate apron conveyor, operated by an individual 10-hp. motor. The clay is fed at a uniform rate by the distributors onto a 24-in. inclined belt conveyor that discharges in equal portions into two or more roller crushers, operated by individual 20-hp. motors. These crushers, which are the company's own design, reduce the clay to a maximum size of 2 in.

From the primary roller crushers, the clay passes to bucket elevators that discharge it equally among five secondary crushers, operated by individual 10- to 15-hp. motors. These crushers, which reduce the clay to a maximum size of 1 in., are manufactured by Bauer Brothers Co., and are equipped with specially designed manganese-steel disks that, despite their relatively high first cost, have proved to be economical.

A kiln-type oil-fired rotary drier, 50 to 60 ft. long and 6 to 7 ft. in diameter, and operated by an individual 20- to 30-hp. motor, follows each set of crushers. These driers are housed in an adjoining drier building. The clay, in passing through a drier, is lifted by longitudinal interior channel irons and dropped through the hot gases present. In the twenty minutes required for the clay to pass through a drier, its volatile content, including moisture, is reduced from 40 to 50 per cent to a maximum of 20 per cent. Chain-drag conveyors of the bucket type move the product of the driers to three hot rock cooling tanks. These tanks are stationary, steel, vertical cylinders; two of them being 28 ft. in diameter and 23½ ft. high, the other 19 ft. in diameter and 47 ft. high. The tanks are well ventilated to carry off suspended dust, heat, and moisture. By means of chain-bucket elevators, the clay is first discharged into the top of the two tanks of larger diameter. Through a series of feed-regulating gate valves in the bottom of these tanks, it passes onto a 24-in. conveyor belt, discharging into a chain-bucket elevator which, in turn, discharges into the top of the third tank, 47 ft. high. This tank is equipped with a hopper bottom and a mechanical Draver feeder, through which a uniform quantity of clay is fed to a ½-in.-mesh electrically vibrating Hum-mer screen. The oversize, after being reduced in a high-speed Allis-Chalmers roller mill, joins the undersize, and passes directly to an 18-in. belt conveyor, equipped with a magnetic head pulley that removes all tramp iron. The clay is then taken to the top of the mill building by a bucket elevator of the belt type, and passes in two equal streams on each side of a fire wall that is built on the centerline of the building. Operations on each side of the wall are identical but distinctly separate from each other. The initial separation in the mill building is made by a Hum-mer screen of the same type employed under the hot-rock cooling tank. Reduction is

effected in roller mills that consist of duplicate sets of corrugated rolls, varying in size from 9 in. by 30 in. to 10 in. by 42 in., and operated by individual

age of fine grades, the principal market demand being for the coarser or granular grades. Hand-made silk of Swiss manufacture is used in the gyrating



Diagrammatic flow-sheet of milling operations.

15- to 25-hp. motors. From each set of rolls the material is conducted to a silk-dressed gyrating sifter, operated by a 5-hp. motor. The oversize or tailing from each sifter passes directly to another set of rolls for further reduction and screening. This operation, as shown in the accompanying diagrammatic flow-sheet, continues until the material has been reduced to the required mesh.

Milling practice is, in general, similar to that employed in milling wheat. The object of gradual reduction is to limit, as much as possible, the percentsifters. It is exceptionally uniform in quality, durable, and can be repaired readily.

After being screened, the clay passes to a series of bins, in which the various individual sizes of clay are stored. The grade of clay most in demand is transported by belt conveyor to an adjoining bulk storage building, where it is discharged from the conveyor into bins of 75-tons capacity. Sixteen bins in this building afford a total storage capacity of 1,200 tons. The other grades are stored in a series of bins situated in the mill building, each bin having a capacity of 75 tons. All bins are equipped with hopper bottoms. Shipments are made in bags and in bulk.

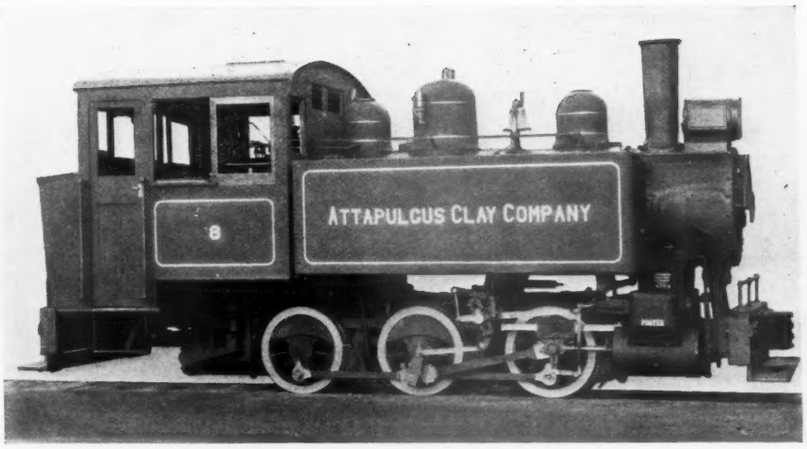
Storage and mill buildings. Car-loading platform in foreground.

In preparing bag shipments, clay is discharged from the bin hopper into a Richardson automatic scale that weighs out the amount of clay necessary to fill one bag —usually 135 lb. The burlap bag, into which the scale discharges, is made of the highest quality burlap, each bag weighing 2 to 2½ lb. After the bags are filled, they are sewed shut, tagged, and transported by hand truck to the shipping platform. Grain-type freight cars are used for both bag and bulk shipments. In making bag shipments, 25 to 35 tons is loaded per car, the bags being placed with the long dimen-

sion horizontal. Bags are the property of the producer and are credited on the consumer's account when they are returned in good condition.

In making bulk shipments, the clay discharges from the bulk storage bins into a large Richardson automatic scale that weighs out 300 lb. at a time, and is capable of operating at the rate of four weighings per minute. From the hopper of the scale, the clay passes to a Stephens-Adamson portable belt conveyor of the Unicon type. This conveyor, which is an 18-in. by 20-ft. unit, is driven by a 2-hp. 1,200-r.p.m. motor. Construction of the conveyor includes a self-locking hoisting mechanism and ball or roller bearings throughout. The clay is discharged by the conveyor onto a portable loader which is placed inside the car to be loaded. This loader, made by the Ottumwa Box Car Loader Co., is known as a fullers'-earth type. It is operated by a 3-hp. motor, and is equipped with a high-speed 18-in. belt. The clay is distributed evenly in the car by the loader, which may be moved readily and adjusted vertically over a wide range.

In selecting railroad box-cars for bulk loading, care is taken to obtain cars that are in sound condition. The sides and floor of each car are covered with heavy paper, and false doors are installed inside the doors of the car. Bulk loading is an innovation in the industry, having been in use but little more than a year. It is rapidly growing in favor among both producers and consumers, most of the advantages involved accruing to the latter. The principal advantages are: no labor costs for handling and emptying bags; charges made for bags that accumulate are avoided, as well as the costs involved in preparing bags for return shipment; the freight expense of shipping bags back and forth is saved. Bulk shipments must of necessity be restricted to all-rail transport.

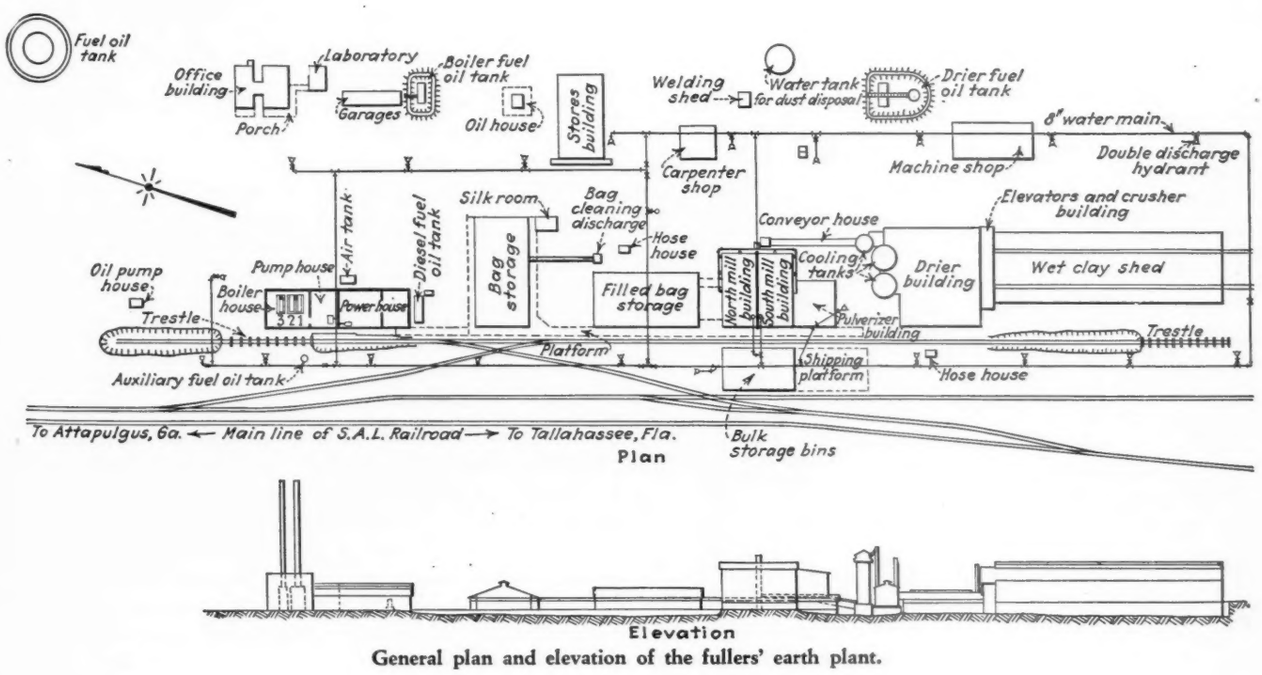


One of the specially-designed 29-ton locomotives.

The milling, crushing, and drying departments of the Attapulgus plant operate 24 hours a day, and the bagging and shipping department 10 hours. More than 400 men are employed at the plant.

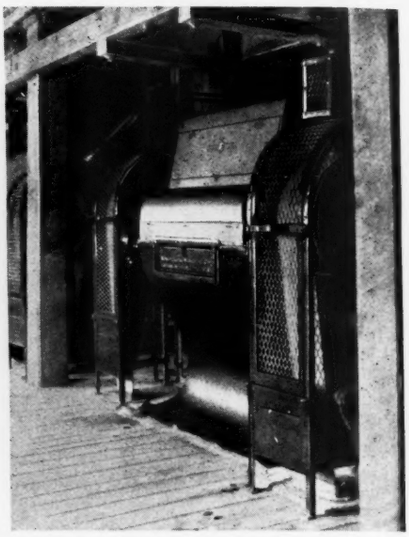
A complete system of water mains, with connections to numerous double-discharge hydrants, is available for fire-fighting purposes. High-pressure steam and electric pumps are employed. Many portable chemical extinguishers and water barrels have been installed throughout the plant and on the floors of all buildings. Inspection of all fire-fighting equipment is made at frequent intervals, and a well-organized fire department is maintained.

Electric power, generated on the property by a Diesel engine and steam turbines, is used. Installation of additional Diesel-engine units is planned to



General plan and elevation of the fullers' earth plant.

A section of the fullers' earth deposit with overburden removed.



One of the roller mills.

replace the steam-turbine plant, which is to be retained for emergency use. The total capacity of the power plant will then be more than 1,500 hp. Uninterrupted power supply is of prime importance, inasmuch as many of the operations are continuous.

Much interest on the part of both the employees and the company is taken in welfare and safety activities. All machinery is guarded to conform with rules and regulations of the National Safety Council. Safety work is supervised by a safety committee, and daily inspection of safety equipment is made by a safety inspector. A high standard is maintained in the living conditions of both white and negro employees. All houses on the property are equipped with electric lights and have running water service.

Acknowledgment is gratefully made to the officials of the Attapulgus Clay Co., for permission to publish the foregoing account, and particularly to C. M. Shaeffer, vice-president in charge of operations, who furnished information presented, as well as drawings and photographs.

Favors Ready-Mixed Concrete

(*Continued from page 61*)

Thirty-five of the 48 state highway departments replied, and 47 cities.

Of the 35 state highway departments replying, 21 reported that satisfactory results could be obtained by the use of a conveyor to distribute the concrete; 4 stated that satisfactory results could not be obtained, and 10 stated "no experience."

On the question relative to the delivery by chute of the material, 18 replied that satisfactory results could not be obtained, 9 replied that it was O. K., and 8 reported "no experience."

Whether or not more satisfactory results could be obtained by weighing the water than by the use of volumetric proportioning was covered as follows:

Negative	19
Affirmative	9
"No experience"	7
	35

A summary of the 47 replies from cities is as follows:

	Yes	No	Blank
Question No. 1	33	9	5
Question No. 2	14	30	3
Question No. 3	12	30	5

Delivery of Product

After studying the detailed replies and a full discussion of the matter, the committee is of the opinion that the most practical solution of the problem lies in the development of a swivel-type conveyor which will place the product where it is needed on the grade. The development of such equipment will overcome the present difficulty encountered where mesh reinforcing is used, make possible the reshaping of the subgrade behind the hauling equipment and eliminate the possibility of non-uniform density which may be caused by the concrete being dumped in a pile and pulled into place by hand labor.

The problem of water control is not confined to ready-mixed concrete production, but is present in any concreting operation. If the majority of the opinions expressed in the replies to the questionnaire are to be considered, then there is no advantage in weighing the water.

The committee feels that the problem of water control is one from which the personal element cannot be eliminated, and the most satisfactory results can only be obtained through close cooperation between, and rigid inspection by, both the operator and the user.

The use of bulk cement is an operation which is rapidly gaining favor in the concrete industry. It is an entirely satisfactory and economic measure if the work to be handled lends itself readily to an operation of this kind. However, the use of bulk cement should only be decided upon after a careful investigation of the project to determine whether or not the layout is such that the use of bulk cement would be of advantage.

Tentative Safety Rules for Quarrymen Adopted by National Council

These rules were adopted on October 2, 1930, by the Quarry Section of the National Safety Council with the understanding that they are subject to such changes as their use for one year by members of the section may necessitate. Quarry operators are requested to give these tentative rules a trial and then to advise General Chairman A. L. Worthen, 67 Church St., New Haven, Conn., of any changes that seem desirable.

PLANT managers, department superintendents and foremen are individually responsible for the safety of their men and for their safe working whether or not specifically provided for in the following regulations:

1. A plan of accident prevention is based on:
   a. Thorough instruction of men as to the hazards of their work.
   b. Clear and complete explanation of rules.
   c. Enforcement and strict compliance with all rules by every employee.
2. Warning signs must be posted at points of danger, indicating the safe practice required. Examples:
   a. "Do not oil or grease this equipment while in motion"—where guards are not provided, because this work may be done when equipment is shut down.
   b. "Stand clear of overhead operations" such as cranes, derricks or shovels.
   c. "No Smoking," "High Voltage."
   d. "Do not enter rail enclosure while equipment enclosed is in motion."

   The spirit of this requirement is to have warning signs where needed and practical as a constant reminder to employees and to forestall any possible excuse that they "didn't know."

3. Superintendents, foremen, their assistants, and any persons whose work deals with specific problems, shall be thoroughly familiar with all state and local laws and regulations pertaining to them. They are responsible for and must see that operations are in compliance with these.
4. The superintendent or assistant superintendent shall inspect each working place at least once each week. A special inspection must be made after a period when the location has not been operated.
5. Foreman shall examine, daily, all machinery and appliances and make sure they are in safe working condition.
6. Foreman must see that proper clearance is maintained on all haulage-ways and working areas so that workmen have sufficient room to perform their duties.
7. Strangers or visitors are permitted only with proper pass and they shall be accompanied by a foreman or someone designated by the superintendent.
8. Injuries and accidents:
   a. Report immediately and completely on proper forms.
   b. Be sure any men who receive minor injuries report them and receive first aid at once.
9. Plant and equipment must be guarded to satisfy industrial safety standards, or your particular state's requirements if they are more rigid. Consideration must be given recommendations of insurance-company engineers. You are responsible for proper guarding and maintenance of the equipment in your department or under your direction and control.
10. Piling must be safely and neatly done. All aisles must be kept clear. Good housekeeping is the responsibility of the head of each department and operating unit.

Safe Practice Rules

For All Employees—All Departments

1. Liquor is not permitted on the job. No employee shall come on the job under the influence of liquor.
2. Horseplay or pranks are expressly forbidden and will not be tolerated on the premises.
3. Your job:
   a. Ask your foreman anything you don't understand. Know your job—don't guess.
   b. Co-operate with "the other fellow." You may need his help some time.
   c. Do not change work or working place without specific orders to do so from your foreman.
4. Unsafe practices.—Help to correct these by reporting them immediately to the foreman.
5. Clothing.—Do not wear loose or ragged clothing. Keep sleeves buttoned and wear overall jackets inside overalls.
6. Injuries.—Report them immediately to your foreman, no matter how slight they may seem. Blood poisoning usually starts from slight cuts, abrasions or blisters. Get first aid at once.
7. Riding on standard- or narrow-gauge equipment or any moving machinery when not specifically a part of your job is forbidden.
8. Tools and Equipment.—Be sure they are in good condition before using. If in need of repair, report to your foreman at once.
9. When entering or leaving premises use regular walkway. Never climb stone-pile, face, or incline in quarry. Never throw any material over face of quarry.

10. Do not ride loaded skips, cages, buckets or cars while being hoisted, or on empty skips, cages or buckets when there is a loaded one in the opposite shaft.
11. Cross main-line or incline-railroad tracks only at regular crossings. Use overhead bridges where available. Do not "walk the pipe line" unless proper ropes or hand rails have been provided.
12. When firing signals are given, get into shelter assigned to you at once.
13. Do not touch any equipment, tools or explosives unless required to do so as a part of your job.
14. Report all defects or damage to equipment or tools to the foreman for immediate repair.
15. When lifting heavy equipment or materials get assistance. Do not overtax your strength.
16. Machines and machinery:
    a. All gears, shafts, sprockets, belts and revolving set screws must be guarded.
    b. Repairing, oiling or wiping of machinery must be done while machinery is not in motion, if at all possible. Do not put on belts while machinery is in motion.
    c. When machinery repairs are completed, extreme caution must be exercised to see that all persons are in the clear before starting the machinery.
    d. Operators are held responsible for the safe operation of their equipment.
    e. Machine operators and signal men must not talk to anyone while machines are operating.
    f. Your machine requires care and must be kept clean to allow inspection of all parts at any time.
    g. When reporting needed repairs give complete details of trouble.
    h. Do not fill gasoline tanks while the engine is running.
    i. Keep gasoline away from open lights and exhaust pipes.
    j. Keep floors free from oil. Be careful not to slip on metal floors which are wet.
    k. No employee will be permitted to use a cutting or welding torch until he is properly instructed by a competent person, and proper type goggles must be worn by the operator.
    l. Do not use leaky hose on acetylene and oxygen tanks. Inspect the hose before using.
    m. Gauges on acetylene and oxygen tanks should be inspected periodically, to make certain that they register correctly.
    n. When handling oxygen and acetylene tanks, great care should be taken not to drop or bump them.
    o. Employees should be careful of poisonous fumes when cutting brass or zinc. A gas mask should be used when performing such work.
17. Electrical:
    a. Persons not employed in powerhouses and switchboard rooms must keep out of them.
    b. Electrical current should never be turned on to lines until it is certain that lines are clear.
    c. Electrical work must be performed with lines dead, when possible, and, when an electrical line or apparatus is undergoing repairs, suitable signs should be hung on the disconnecting or starting switch cautioning against closing the switch.
18. Any employee designated to enter a chute at a crusher, rock or plaster bin or silo, or to work at or on the steep face of a rock-pile or a sand bank (height, 12 ft. or more), must wear a safety harness, with someone present at the place of entrance during the time the man is working.
19. Emery wheels or other grinding apparatus shall be used only with required eye-protective equipment in place and in good condition—goggles or eye shields—as occasion may demand.
20. All guards provided must be kept on equipment while it is operating. If repairs have been made, guards must be replaced before equipment is again started.
21. Do not stand or sit on tracks to talk.
22. Where both men and rock are hoisted, all hoisting and cable clamps shall be examined twice during each hoisting shift, once at the beginning and once in the middle of shift, under direction of foreman. If 10 per cent of the wires in a cable are broken the cable must be replaced.
23. Vertical lime kilns:
    a. A vertical kiln frequently hangs up when it is drawn so that it is necessary to resume firing in this condition. Under such circumstances, whenever the doors of the furnaces are opened, operators should keep the head down as a protection against the flame if the kiln should drop at that time.
    b. Tramways across tops of kilns should be well constructed, with ample walkway and an extension of the platform between the kilns so as to catch any stone that may fall from a car when crossing the tops of the kilns or when being dumped.
    c. Do not leave hot pokers lying on the ground. Always work with a poker that is reasonably cool. Do not use bent pokers.
    d. No man shall enter the top of the kiln except that he be provided with a life belt or a safely-tied loop of rope and with two other men on top of the kiln to effect his rescue in case of asphyxiation.
    e. Do not dump cars containing an accumulation of water into hot kilns.

Explosives

1. Do not smoke while using or handling any explosives.
2. Do not handle explosives near open lights, other fire or flame, or sparks.
3. Do not use any tools other than wooden wedges and wooden mallets for opening cases containing high explosives.

4. Do not drive a hole into a keg of blasting powder, but open the keg by removing the slide from the bung.
5. Do not use frozen explosives or attempt to thaw frozen dynamite.
6. Do not leave high explosives, blasting caps or electric blasting caps exposed to the direct rays of the sun.
7. Do not use metal tamping sticks or tamping rods in loading or tamping (stemming) explosives.
8. Do not force a cartridge of high explosives into a bore-hole.
9. Do not explode a charge to spring or chamber a bore-hole and then load another charge into it before it has cooled sufficiently.
10. Do not use old or damaged leading or connecting wire in blasting circuits.
11. Do not connect up or load bore-holes for electric firing during the approach or progress of a thunder storm. If charges are already loaded and connected, all persons should be kept at a safe distance from them while the storm is in progress.
12. Do not have electric wires or cables near detonators, explosives or charged bore-holes at any time, except for the purpose of firing the blast.
13. Do not fire a blast until everyone is warned and guards are stationed on nearby highway approaches.
14. Do not attempt to investigate a misfire too soon. When fuse and blasting caps are used, at least one hour should be allowed before returning to a misfire. In the case of electric blasting caps, at least fifteen minutes should be allowed.
15. In case of misfired charges in well-drill holes, part of the tamping may be removed and a small charge placed and fired near enough to explode the main charge. In plugger-drill holes, another hole should be drilled at a safe distance away, but with the view of exploding the missed charge. Great care should be taken to recover any explosives from a misfired charge.
16. Do not lace safety fuse through dynamite cartridges.
17. Do not cut fuse on a slant, but cut it square across. Cut off an inch or two of fuse to insure having a fresh end inserted in the blasting cap. See that the fuse is seated against the detonating agent in the cap.
18. Do not use short fuse. Cut fuse sufficiently long to extend beyond collar of hole, for perfect safety.
19. Do not crimp blasting caps to fuse with pliers, knife blade or with the teeth, but see that the blasting cap is securely attached to the fuse by means of a suitable cap crimper.
20. Do not allow priming (placing of a detonator in the dynamite cartridge) to be done in a magazine.
21. Do not make up primers (that is, do not insert blasting caps or electric blasting caps in cartridges of explosives) before actually necessary.
22. Do not use any detonator weaker than a No. 6.
23. Do not attempt to remove or investigate the contents of a blasting cap or electric blasting cap.
24. Do not carry blasting caps or electric blasting caps in pockets of clothing, or in the bed or body of a vehicle containing other explosives.
25. Do not store blasting caps or explosives in any home, boarding house or other human habitation, or leave them lying around where children can get hold of them.
26. Do not leave explosives in a wet or damp place. They should be kept clean, cool, dry and well ventilated.
27. Do not store explosives so that the cartridges stand on end.
28. Do not store fuse in a hot place as this may injure the fuse and cause the waterproofing material to damage the powder train.
29. Do not handle fuse carelessly in cold weather. When cold it is stiff and breaks easily. It should be warmed slightly before using.
30. Do not have matches about you unless they are safety matches.
31. Do not allow explosives or drill-holes (while being loaded with explosives) to be exposed to sparks and wherever practical a portable shed shield of fireproof construction should be used.
32. Do not attempt to take blasting caps from a box by inserting a wire, nail or other sharp instrument.
33. Do not spare force or energy in operating blasting machines.
34. Do not connect leading wire to blasting machines or allow it to come into contact with any other source of electrical current until immediately before firing and after everyone is in a safe place.
35. Do not handle packages of explosives violently, or slide them along floors or over each other.
36. The number of pop-shots fired in one round should be governed by local conditions (such as area over which shots are distributed) and the shooter should seek shelter when warning cap explodes.
37. When dynamite is removed from the wrappers in loading, the wrappers should be put into the holes.
38. Before firing, make sure that all passageways are guarded or flagged and that everybody is clear of the blast. Sound a warning signal.
39. In case of misfire or a blown-out shot, no one may tamper with the hole. It shall be marked out and the foreman notified immediately. He shall personally direct the work. The charge must never be dug out with an iron or other metal spoon or tool. No one may drill into it. Another hole shall be drilled at least two feet away and running away from the misfired shot.

Drilling and Barring

1. You must watch for any missed shots or loose pieces of dynamite and report them to the foreman immediately.
2. Machine runners, loaders and others at the face shall remove all loose rock before beginning work or setting up drills. Report signs of roof crumbling or caving to foreman at once.
3. When working, face the quarry so you can see any loose stones.
4. Make sure of footing and be particularly careful of slipping and falling when stepping on stones.
5. Warn fellow workmen when starting to bar down rock.
6. Pry down all loose chunks on the loading pile to prevent rock rolling.
7. When sledging:
   a. Close your eyes at the moment of impact so that particles will not strike your eyes.
   b. Use proper tongs to hold tools.
8. Drillers must be exceptionally alert at all times.
9. Men must watch for sliding rocks above them.
10. Men must be sure of firm footing before starting to drill.
11. Drill steel may break suddenly. Be in the clear if this happens, so the machine will not fall on your foot or throw you off balance.
12. Do not drill in old holes, within 2 feet of a missed shot, or under or into loose rock.

Machinery

1. Only the regular operator or one specifically designated by the foreman may operate shovels, draglines and stiff-leg derricks.
2. Inspect all parts daily and have defective parts repaired at once.
3. Use a safety dog on the boom cables in addition to the foot-brake control.
4. Place the shovel in a position so that the operator can see all loading operations and can know the exact positions of men who may be working near.
5. Lower the boom slowly to eliminate the swing of the bucket.
6. Load cars so that rock or dirt will not fall off while in transit. Do not stand close to cars being loaded. Operator must not swing loaded bucket over locomotive.
7. Put stones which are too large for loading, behind or out of the way, so they may be broken up by small shots.
8. Keep all cables well lubricated.
9. Oil and repair in daytime. Stop machinery and place the bucket on the ground. If necessary to oil sheaves at night, two men must be present.
10. When making repairs, the operator himself must move or place the boom.
11. Lock the door on the crane house while repairs are being made so that no one can tamper with the machinery.
12. If necessary for someone to climb the legs of the stiff-leg, be sure that the man doing this is alert and physically able to do the work well.
13. In stripping, remove the overburden far enough back so that rock or other material may not fall over the face.
14. Men must not work where shovel or dragline buckets may swing over them.

Railroads

Trackmen

1. When working on track, place a yellow flag 300 ft. on either side of the working place.
2. Trains must not be permitted to pass along any track until all repair work is completed.
3. When two or more men are carrying a rail or other heavy material be sure every man is ready to drop it at the same time.

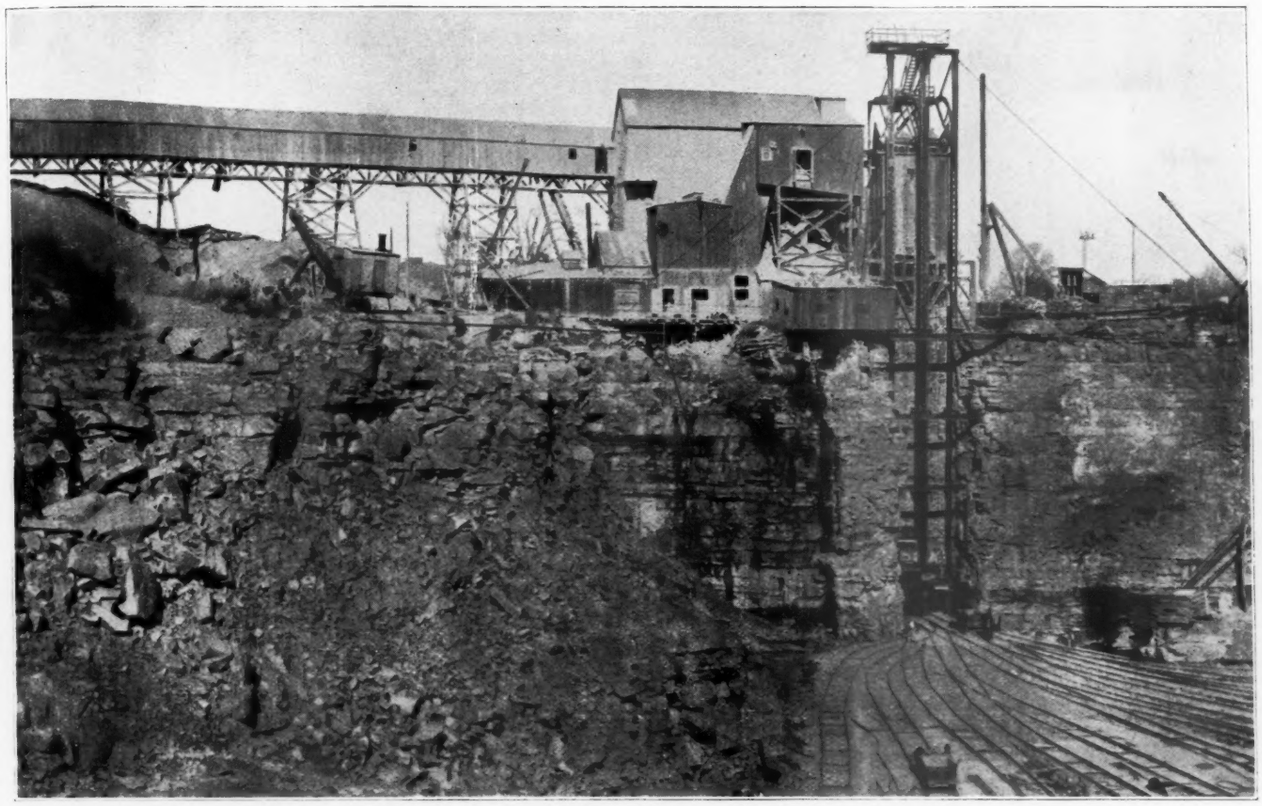
Trainmen

1. No one except an engineer, brakeman or electrician is permitted to operate a locomotive. Exceptions may be made only by the foreman.
2. Switches must be set for the main track and locked. Keys must be kept on the locomotive.
3. When repairing a locomotive, a red flag must be displayed. No coupling or moving of trains is permitted at this time.
4. While oiling a locomotive, inspect all parts. Report defects to the foreman for immediate repair.
5. Trainmen must not permit anyone, except those whose duty it is, to ride equipment.
6. Trains or locomotives in motion:
   a. When about to move and while moving and when crossing roads the locomotive bell must be kept ringing.
   b. When approaching a crossing, sound two long and two short blasts of the locomotive whistle.
   c. When shunting cars in yards, a trainman must be in position to signal the engineer or to control the moving cars.
7. All other than main-track locomotives (or those on extra trips not scheduled) must be unusually careful when on main track. Trainmen must determine in advance that a track is clear.
8. Coupling is dangerous. None but experienced trainmen may do this work.

Increasing Exports of Bauxite in Yugoslavia Reported

Yugoslavia holds fourth place in world production of bauxite, and third place in European production. The best grades of bauxite are found in Dalmatia and Herzegovina, first choice being usually given to that from Kalun Drnis. Exports of bauxite from the entire country have grown from 486 metric tons in 1926 to 97,300 in 1927, dropped to 53,704 in 1928, and were 64,259 in 1929. Germany is the principal purchaser of Yugoslav bauxite, largely because aluminum production has not been greatly developed in other European countries. The Yugoslav government is said to favor the German interests also in exploitation of sources of raw material, as in the past Germany has always exploited mining claims which it has acquired, rather than treating them as subjects of speculation.

Operates Two Stone Plants Within Four Miles of Downtown Montreal



The larger of the two Villeray plants showing the hand loading in the quarry, the balanced ship hoist to the plant and the stock-piling conveyor at the left.

Advantageous Locations Permit Producer to Make Prompt City Delivery by Truck

THE city of Montreal, Que., has, within its limits, nine stone quarries most of which are actively producing crushed stone, and possibly a dozen more plants operating within a few miles of its limits. Most of these are small plants with capacities of from 500 to 3,000 tons per day and most of these deliver by truck only to construction and paving projects in and around the city. Probably no other large city on this continent has its supply of stone so readily accessible.

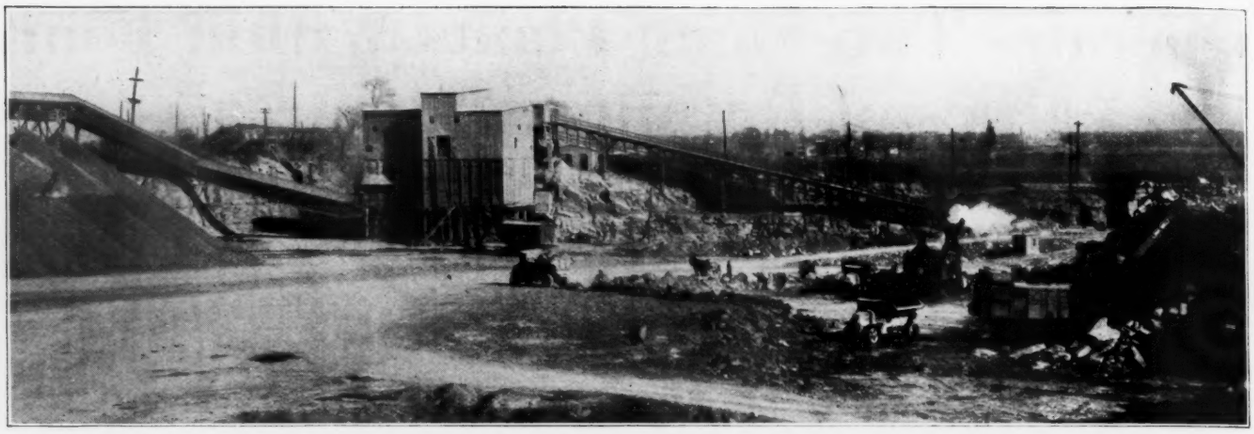
Two of the most important quarries within the city limits of Montreal are operated by the same interests but under separate names. The larger of these plants, operated by the Maissonneuve Quarry Co., Ltd., has a capacity of 300 tons per hr. and is located about four miles northeast of downtown Montreal. The Villeray Quarry Co., Ltd., operates a quarry which also is about four miles from the business section of the city but to the north. Two separate plants are operated at this quarry, one having a capacity of 50 tons per hr., the other of 130 tons per hr. Only the larger of these plants is being operated.

Operations at the Maissonneuve quarry were first begun in 1905 when the original plant was built. This plant was enlarged and improved a number of times, and in 1927 it burned to the ground. It was then decided to abandon this site and to open a new quarry across a highway from the old one, using the old quarry as a city dump. The new plant went into operation in 1928.

The deposit here consists of a top layer of about 15 ft. of very hard traprock below which is limestone. The quarry face averages about 28 ft. in height. Drilling is done with well drills and the blasts, which are generally of only a few holes because of the proximity to a residential section, are electrically detonated. The stone is loaded by a 2-cu. yd. Link-Belt Diesel-powered shovel and a Bucyrus-Erie 41 B 1¼-cu. yd. steam shovel into 10-cu. yd.-capacity Mack trucks with Easton side-dump bodies.

The trucks discharge to a hopper at the plant under which a Kennedy-Van Saun plate-feeder discharges to the Buchanan 42-in. by 48-in. primary jaw crusher. Due to the use of trucks in the quarry, great care is taken to keep the quarry floor smooth. Loose stone is loaded by hand into two-wheel horse-drawn carts and dumped into the primary crusher.

The crusher discharges to an inclined conveyor

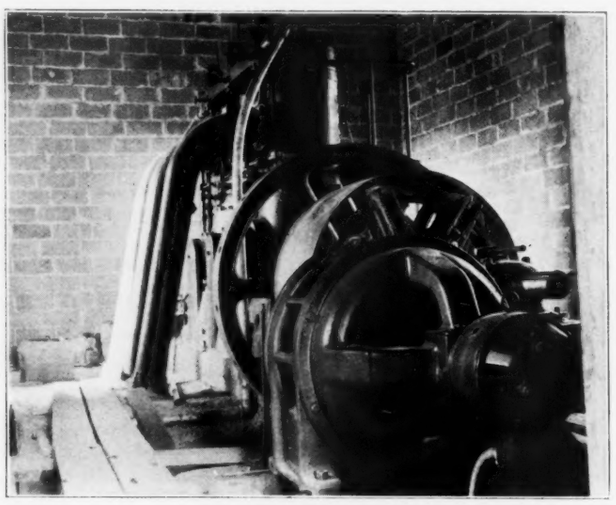


The Maissonneuve quarry and plant from the southwest. Quarrying operations at right, stockpiling system at left.

leading to the screening plant where it discharges to a revolving scalping screen with 4-in. perforations. The oversize drops to two Austin gyratory crushers, a No. 7½ and a No. 5, while the stone under 4-in. goes to a Symons 4-ft. cone crusher. All three of these crushers feed to an elevator to the top of the screening plant. Here revolving screens produce 2-in., 1½-in., 1-in., and ¾-in. stone. The oversize from these screens goes back to the Symons crusher by a series of conveyors while the ½-in.-and-under goes to a Niagara 4-ft. by 8-ft. double-deck vibrating screen. This produces ½-in and ¼-in. stone and dust. A Stephens-Adamson 4-ft. by 6-ft. double-deck vibrating screen is now being installed for further screening of the dust which will be used in the new asphalt plant under construction at the company's yards.

Timber bins under the screens with a capacity of 3,000 tons are used for truck loading. An arrangement of four belt conveyors also allows stock-piling of material from the bins. A horizontal conveyor under the bins feeds to an inclined conveyor which, in turn, feeds another inclined conveyor which, in turn, feeds to a third inclined conveyor at an angle to the first. This conveyor feeds a horizontal distributing conveyor operating on 600-ft. centers. These conveyors are supported on a steel framework from the top of the quarry face which has been worked as far as possible towards a nearby highway. All of the conveyors have wooden housings. The long horizontal conveyor has a tripper which feeds to stock-piles in the quarry below. This arrangement has a storage capacity of about 30,000 cu. yd. It is planned to extend the distributing conveyor another 300 ft. which will give an even greater storage capacity. A Bay City 14-ton locomotive crane with a ¾-cu. yd. clamshell bucket rehandles the stock-piled stone into trucks for shipment.

As has been stated, only the larger of the two plants at the Villeray quarry is being operated. This plant was built in 1922 and, in many ways, is similar to the Maissonneuve plant. Cars are loaded by hand and carried by a balanced skip-hoist to the plant. The stone discharges to a Gates No. 7 primary crusher. Scalping is done by a revolving screen, the oversize going to a Traylor secondary crusher. Niagara vibrating screens size the stone. As at the Maissonneuve quarry, the stone is stored in wooden bins or goes by a belt conveyor to ground storage. At this plant, however, the stock-piled material is recovered by a belt conveyor operating in a tunnel under the piles.



The 180-hp. Diesel engine which generates power for the new plants.

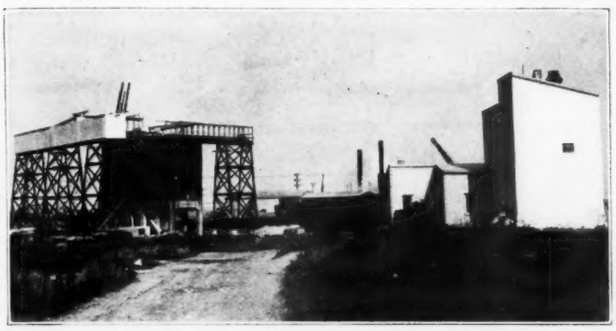
The new 2-cu. yd. Diesel-driven shovel loading truck in quarry.

Deliveries are made either direct from the plants or from the company's yards at 4740 Iberville St. Stone and sand only are handled there. A new sand-and-stone-handling plant and a cold-paving-asphalt

plant are being completed at this yard. The Maissonneuve quarry is also fitted so that deliveries can be made over an electric railway which has a siding into the plant.

The sand-and-stone-handling plant will be unusually efficient and is of the most modern type. Cars or trucks will dump into a 2-section track hopper which feeds onto a belt conveyor in a concrete tunnel. A bucket elevator will feed to a horizontal distributing conveyor with a tripper to allow discharge into any of the five compartments in the 1,500-ton-capacity timber bin. The same tripper can also feed a conveyor to a second distributing conveyor which will discharge to a stock-pile of 10,000 cu. yd. capacity parallel to the bins.

A conveyor in a concrete tunnel under the stock-pile will recover the stored material and feed to a second tunnel conveyor at right angles which discharges to the elevator to the storage bins. The tripper above the bins can also discharge to another stock-piling conveyor on the opposite side of the bins for storing fine and coarse sand for the new asphalt plant.

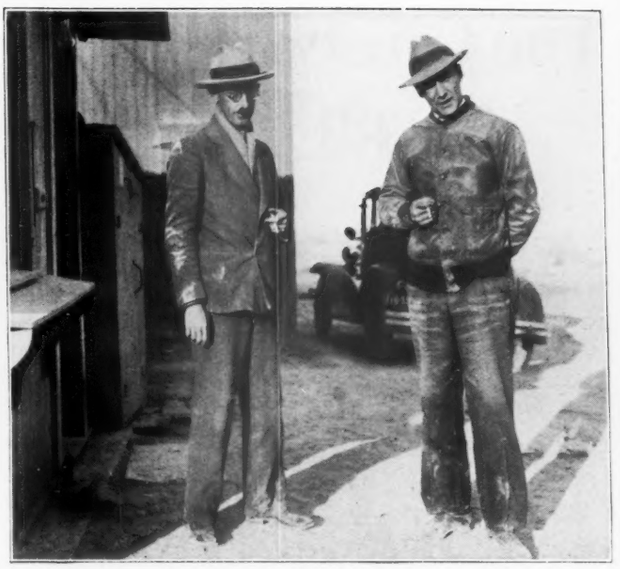


The stone storage and loading plant at left with the asphalt plant at right.

This plant was designed by the company and is entirely of concrete and timber construction. The bins are built of 2-in. by 5-in. timbers laid flat and braced with steel rods. All conveyors, elevators and trippers, were furnished by the Stephens-Adamson Mfg. Co.

The new asphalt plant is of similar construction but uses imported machinery almost exclusively. This plant will introduce a type of pavement new to Canada, but which has been popular in Europe for many years. This type of cold-paving asphalt is claimed to be superior to any now used in Canada and can be stored in stock-piles for 2 or 3 years without deterioration. A generating unit is being installed in the same building to furnish power for both the stone and asphalt plants in the yard. A Fairbanks-Morse 3-cyl. 180-hp. Diesel engine drives a General Electric generator for the production of 550-volt current.

Truck discharging load of stone to crusher. Cart load of cleanup stone from quarry floor at left.



Leon Bernardin, chief engineer, at left, with Philip Morin, superintendent Maissonneuve plant.

Officers of the Maissonneuve Quarry Co. and the Villeray Quarry Co., Ltd., both of which have offices at 4740 Iberville St., Montreal, are: Joseph Rheaume, president; J. Azarie Boutet, general manager; P. Ed. Houde, secretary and treasurer; Leon Bernardin, engineer; and J. Avila Hetu, general superintendent.

Deposit of Bituminous Sandstone in Utah Discussed in Report

The geology and commercial possibilities of a large deposit of bituminous sandstone in Asphalt Ridge, a few miles southwest of Vernal, in Uintah County, Utah, are discussed in a report by E. M. Spieker just issued as Bulletin 822-C by the Geological Survey, Department of the Interior. The report is accompanied by a sketch map showing seven localities along a strip of outcrop about 11½ miles long at which the thickness of the bituminous beds was measured and their relative richness estimated. Analyses show that the bitumen content of the sandstone ranges from about 8 per cent to a little more than 15 per cent by weight. On the basis of these data and the assumption that the mining can be carried back 1½ miles from the outcrop, it is estimated that the whole area examined should contain about 1,175,000 cu. yd. of bituminous rock. The bituminous sand as it is mined has been successfully used for paving the streets of Vernal. The bitumen may possibly also lend itself to hydrogenation, so as to yield motor fuels and related products.

The Cause and Remedy for Some Common Troubles with Crusher Bearings*

By L. D. STAPLIN
President, Carbonite Metal Co., Ltd., Chicago, Ill.

I REQUEST my listeners who are familiar with the mechanical conditions in the bearings of the various types of crushers to form an opinion as to whether or not any single metal alloy can take care of them. Such an alloy would need to be both hard and soft: it can be either hard or soft but not both.

Jaw and Roll Crushers

L. D. Staplin

The most common trouble with pitman bearings is heating. It results from the load, plus the fact that the load tends to force out the lubricant and the dryness of the bearing surface, then permits friction so that the bearing starts heating. As a result of this dryness, the shaft may score. As soon as this occurs, the load-carrying area of the shaft is reduced because it then presents only its higher contact portions to full contact with the babbit. The originally intended distribution of load is gone and the localized pressure causes a condition whereby the bearing can not subsequently serve at its best standard.

The load area being reduced, the pressure per unit of bearing surface is increased and this increases the tendency of the box to heat. The remedy is to provide exactness and permanence of alignment in the fit given the bearing so as to maintain a strong oil film.

Not rarely but frequently I see expensive machinery such as tube mills with the shafts so scored that subsequent operation is costly and troublesome. Originally these shafts scored because of faulty-bearing practice, a thing that is easy to avoid if one understands it.

As to alignment, it is not enough to line up the bearing, start the machine and then forget about it. Usually the effect of a day or two of running is to throw the bearing somewhat out of alignment. The machine should again be inspected and adjustment made when necessary.

When oil reaches the load area, the load tends to force it out at the ends of the bearings. When oilways are placed in the load area, there being less resistance in them than upon the bearing's surface, the oil is forced into them and they act as drains that cause the journal to run more dry. Instead of being helpful, as we have been taught to believe, they are harmful. It is a safe rule to keep oilways out of the load area.

The following has been found the best method of grooving two-part bearings so that the load surface will hold the most constant and strongest film of oil. Oil preferably should enter at the section under light load and then feed over the load area. At point or points of entry, cut a medium large groove three-fourths of the way toward each end. At a point about 1 in. inside each end, cut a medium-sized groove parallel with the ends all around the liner. Where the two halves join, start at a point about ½-in. inside each end and between those points remove some of the metal. Cut away about one-half the thickness of the metal on the central sides, tapering the cut to almost nothing at a point about ½ in. outward in the bearing.

When the bearing is set up, it will have two storage chambers or reservoirs for oil with two end grooves to feed oil into them. As oil reaches the load area, the load tends to force it out at the ends of the bearing. Some of it is caught by these end grooves and conducted by them into the chambers. The pressure of further oil entering the chambers through the end grooves, causes it to spread out into the chambers whence it again spreads down over the bearing surface. There being no oilways into which it can drain, it must stay upon the surface and do its duty.

If these end grooves are too small, an excess of oil is forced out at the ends of the bearing and, if too large, the oil does not feed steadily into the chambers. Judgment should be used as to their size. The cooler the usual running temperature of the bearing is and the heavier the oil used, the larger they should be. If it is a bearing that regularly runs warm, the heat will thin the oil, so smaller grooves should be cut. The same holds true if we were to use a medium-bodied oil as compared with the size we would use if the oil were extra heavy viscous body. If situated in a northern country we would use a little larger end grooves than if situated in a hot climate.

Oilways that run lengthwise particularly should not have straight walls. They should be dished so

* Presented at the 1931 convention, Natl. Crushed Stone Assn., St. Louis. Copyrighted by author, and all rights reserved.

that if the box happens to heat and soften the metal, the walls can not be easily mashed down and prevent oil distribution. No grooves should have sharp edges that may act as a wipe that will rupture the oil film.

I understand the Hill Clutch Co. of Cleveland, O., has experimented with an electric light attached to a bearing so adjusted that when metallic contact occurs between babbitt and shaft it would burn. By watching the action of this lamp we get a good line upon what is going on in the interior of the bearing since the light will not burn when there is enough body to the oil film to prevent metallic contact between the babbitt and the shaft. We thank this company for originating this practical device as well as for other mechanical achievements. My tests along the same lines showed that oilways placed as before described provide two-part bearings with the best oil film.

Comparatively limited research has been given to babbitt-bearing engineering. The standard data supplied by some of the leading authorities have proved faulty. All that designing engineers and machinery builders have to go by are the available data and their experience. Thus some machinery enters the market with poorly designed bearings because of the scarcity of dependable bearing data, the designers ought not be blamed. There are quite a number of jaw and roll crushers that give users troubles because of faulty original bearing design. I have come to recognize some of them as "tramps," i.e. crushers which give their users enough troubles so they are disposed of, and then they bob up later at other places.

The bearings of such crushers can not serve properly until the situation is recognized and then the trouble can not always be completely cured although, in most cases, substantial improvement can be made by using metal specially prepared to fit the situation. There is little extra charge for metal of this kind. I have seen crushers run two years that formerly had to be metalled every few weeks. Usually a case of this kind signifies itself by the bearing heating enough to continually allow the metal to flow out under the load. Or the shaft subjects the liner to such an amount of combined load and impact as to cause the metal to flow or squeeze out while the bearing is cool or not more than normally warm.

Hammer-mill Crushers

The main trouble with hammer crushers is heat. In some, the source of the hot bearing inheres in the lubrication. Because the lubrication has not been A No. 1, for the shaft has become scored and we have the same condition previously described for jaw- and roll-crusher bearings. An important cause of scoring is the use of the wrong kind of bearing metal. Until proved necessary by experience that a well made lead-based bearing metal flows out under the load, no tin-based metal should be used in a hammer mill, because tin-based bearing metal scores the shaft more than does a lead-based metal. If the shaft can be prevented from scoring, you invariably get better service from the bearing than can be had after it becomes scored.

If the shaft is scored, the remedy is to either dress the shaft (and that is advisable only when it can be trued by taking a small cut) or put in a new shaft. In no case when a new shaft is put in should it be cold-rolled shafting as this is a mild or soft steel of 10 to 20 carbon and cuts, scores and wears easily. A steel that is enough harder to resist wear and scoring is desirable. Such a steel is the Jalcase, made by Jones and Laughlin Steel Corp., of 30 to 40 carbon. This steel is stronger, machines as easily as cold-rolled shafting, and costs but ½ cent per pound more. After this shaft is in, pay special attention to the kind of metal used and the lubrication. This detail will pay dividends.

In some types of hammer mills the major cause of trouble with long bearings is misalignment which causes the shaft to bind in the box.

There are great differences between the body hardnesses of bearing-metal alloys. Some are harder and more unyielding than others. It is essential to use a bearing material which will quickly relieve the excess pressure by distributing the load over a larger area, otherwise the load, being concentrated upon one small area, sets up enough friction to possibly cut, score or melt the liner. An adequate metal has enough body firmness to support a good load and, at the same time, is sufficiently plastic and yielding to quickly give and provide a better distribution of the load. Such metal can be had by describing your condition to a competent bearing-metal manufacturer.

Gyratory Crushers

The required replacement of eccentric bearings is due to wear; to metal breaking, cracking, crumbling or chipping out; or to melting or squeezing out—three distinct causes, each of which the operator should understand so that he may correct them by proper remedies.

Wear may be imputed to several factors. The hardness of the rock is one of these, because the harder the rock is, the greater is the load on the bearing. Another factor is the fit of the dust collar in excluding stone and dust. A third factor is the combined hardness and toughness of the babbitt metal. Finally the temperature at which the bearing runs is significant, since the warmer the bearing, the softer must be the body of the metal and the faster its wear.

Where the material broken is extra hard—as granite—the rate of wear may be such as to warrant the use of an extra hard metal in order to get permanence. The life of a metal of this kind is about as five to one compared with usual metals.

In eccentrics we can safely use a harder metal without damage to the shaft, for two reasons. First, these bearings usually receive an ample clearance, 3/32 in. overall diameter. Second, the shafts are hard steel and do not cut or score easily. Although a hard bearing metal ought not be used against ordinary shafting because of the scoring that results, it can be used with good results in an eccentric. Liners are now in their third year of

service and excellent results have been obtained.

In these harder metals we materially increase the body hardness of the bearing metal so as to decrease the rate of wear caused by the particles of stone and dust that work into the bearing through the dust collar, and to enable it to resist the heavier stresses met in breaking hard materials. None of these metals is as easy to melt and handle as the usual metals and, when used, the bearing must have strictly free clearance. When it is necessary to use them, the operator can save a substantial sum, varying with the size of his operations. Frequently these are the only alloys of enough body hardness to durably resist the shocks and loads carried by some roll- and jaw-crusher bearings.

The usual bearing metal loses around 40 per cent of its original hardness of body upon being warmed up to 160 F. When a bearing warms, this softening of its body permits the liner to compress. As the bearing is heated, the expansion which accompanies the heat thickens the liner and there is a tendency for the liner to grip the shaft and heat. This is relieved as soon as the pressure compresses the liner and the bearing then usually cools down and runs satisfactorily.

When the modern extra-hard metal is used, we must bear in mind that our old ideas of clearance are all based upon the use of the usual softer metals—metals which are very sensitive to the softening effect of mild heat. Mild heat does not soften the harder metals and we should make allowance for the difference in the nature of the two materials by providing new bearings with free and easy running clearance. We then invariably get a satisfactory bearing that is not likely to fail should it happen to be neglected as to oiling. Before a lining made of this metal fails, enough heat must be generated to ignite the oil, cause it to smoke, or otherwise signal attention.

The temperature at which the bearing runs has a much greater effect upon the life of the bearing than the average person would think possible. As an average bearing metal softens very fast from the effect of mild heat and as the rate of wear is in ratio with the softness of the metal, the life of the bearings can be lengthened by running them as cool as possible.

Positive lubrication is the only kind worth considering. There are gyratory crushers equipped with complicated automatic oilers and, if anything happens to any of the many working parts, lubrication is possibly stopped. A good remedy for such troubles is to junk the oiler. You can hook a rotary-geared pump to the counter shaft and tap in a drain pipe that will flow oil when the crusher is carrying a sufficient supply, and you not only get positive lubrication but, by turning a cock, you can tell whether or not the crusher needs oil. S. C. Burtis, superintendent, Dolese Bros. Co., Buffalo, Ia., uses this method and advises me that he will furnish users the details without charge. Incidentally, at his plant, there are running two eccentric liners that have been in service more than six years.

In the Moulding-Brownell plant at Thornton, Ill., W. J. Black, general manager, operates nineteen Gates Type K crushers ranging in size from No. 4 to No. 24. These average more than three years' wear per bearing. This life is probably due to combining two essentials: suitable bearing metal and a method of cooling the eccentrics. The method is of local design and it works although the reduction crushers run at a speed of 400 r.p.m. instead of at the recommended maximum speed of 275 r.p.m. That means money in production. The eccentrics are water-cooled. A 1¼-in. pipe leads to the eccentric and from it four smaller pipes are tapped and spray water against the base of the eccentric. The cooling effect is conducted into the bearing.

Some bearing metals are brittle and possess little resistance to fatigue with the result that linings made with them, after a comparatively short time, gradually crumble, crack, break and chip out, either in small or large pieces.

The effect of continued stress upon a metal is to cause it, eventually, to reach its fatigue point and, thereafter, its body structure gives way or disintegrates. Some alloys are, for practical purposes, permanently resistant to fatigue, i.e., they will last longer than the normal usual life of the assemblies of which they are parts. Others fail very early. Some bearing metals are so extremely hard, ductile and resistant to fatigue that their use stops this kind of trouble. The only case in which they could fail would be where metal, eccentric or mandrel, were overheated at the time of pouring.

It is not necessary to heat a mandrel. It should be clean and either chalked, smoked, or coated with the thinnest kind of a grease film such as remains when grease is smeared on and then is wiped off with dry waste. If the eccentric be heated, it will impart enough warmth to the mandrel. As a rule, metal should not be moulded when warm enough to cause an inserted strip of paper to blaze nor should it be poured against a mandrel or eccentric that is warm enough to sizzle water. When metal is just under the heat at which it will blaze paper and when mandrel and eccentric are warm enough to cause water to evaporate quickly, they are warm enough. Then prepare things so that the bearing can be poured fast. If this be done and the right kind of metal be used, a liner will never be lost because of breaking and chipping.

If a lining squeezes out, it is due either to use of a bearing metal which has a body structure that is too soft to stand the pressure or shocks or to heat such as is generated by friction when the lubrication is defective or that results when a shaft is sprung enough to bind in the bearing. Excessive wobbling of the spider indicates a sprung shaft. This can be determined by calipering the end of the shaft where it enters the eccentric. Unless the clearance is equal all around, it is sprung.

When a shaft is badly sprung, it binds and causes so much heat that the bearing trouble usually necessitates a new shaft. If it is only slightly sprung, a small cut will true it. Thereafter, since the bearing area has been made smaller, pressure against the babbitt metal is increased and, gen-

(Continued on Page 79)

Employs Individual Gasoline Engines on Machinery in Gravel Plants

Michigan Producer Adopts Idea After Intensive Study of Local Power Costs

AS a result of an intensive and careful study of power costs involved in the use of the several types of power available, the firm of Scarlett & Earl, Inc., of Lansing, Mich., chose the use of individual gasoline-engine driven units as best suited to the conditions surrounding its operations. That the choice was a wise one is evident from the fact that both of the company's plants have operated for two full seasons without a delay due to the failure of a power unit and at a power cost that will compare favorably with any other form of power.

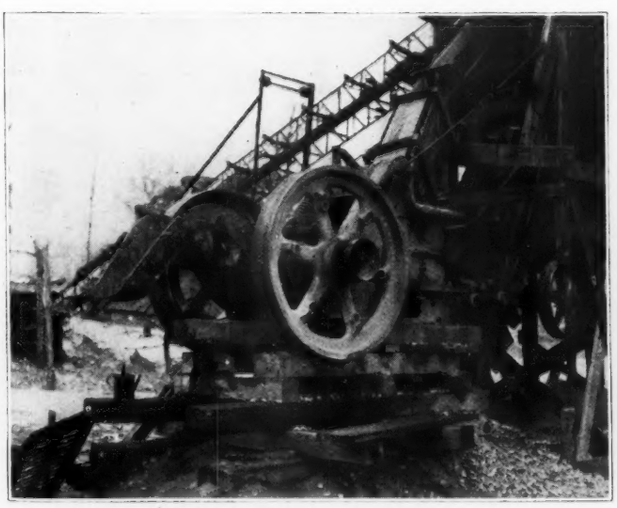
General view of larger gravel plant.

This firm actually started in as a legitimate producer of sand and gravel five years ago when it purchased a small plant in North Lansing. Previous to that time it operated portable plants to furnish material for sheet asphalt paving work. In June, 1928, a new plant was built at the present location and the old one was then used for road gravel only. During the winter of 1928-29 this plant was also moved to the present location. The gravel plant has a capacity of 40 cu. yd. per hour and the road gravel plant of 30 cu. yd. per hour.

The property on which these plants are located lies about 8½ miles southwest of Lansing, on the Grand River. It is not near a railway so truck shipments only are made. Most of the product of the plants goes to Lansing for paving and construction work and some for road work in the vicinity. The 50 acre property is all gravel with an average of 60 ft. of gravel deposit above the water level and 20 ft below. The material averages about 50 per cent gravel of which 20 per cent requires crushing.

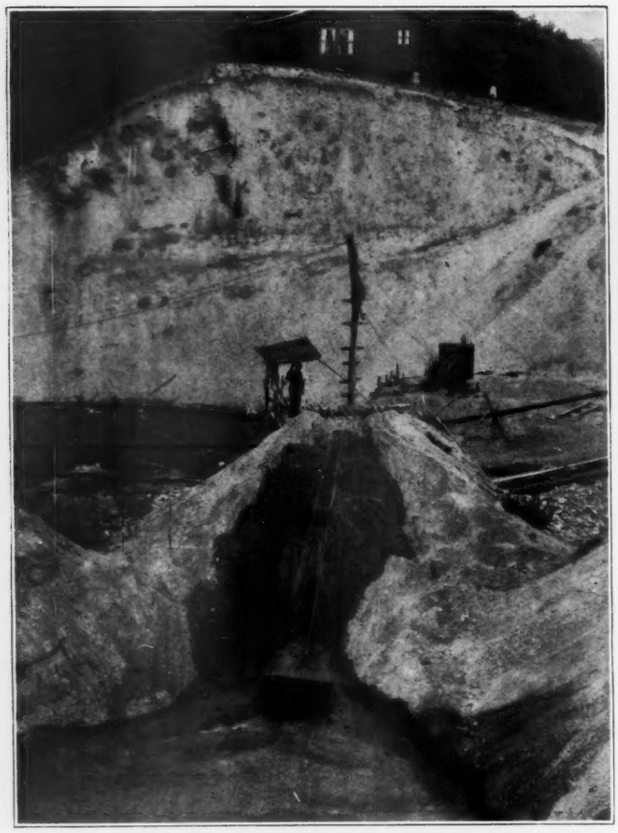
Some trouble was encountered for a time in stripping overburden from the gravel as there are quite a few trees on the property. Through an agreement with the neighboring farmers, they are now removing the trees for kindling wood. The overburden, which averages about 2½ feet in thickness, is removed by a steam shovel. This will be replaced with a gasoline shovel before the next season opens.

The main plant pit is being excavated under water by a Sauerman 1-cu. yd. Crescent scraper, the banks being allowed to cave into the pit. The scraper feeds through a 6-in. rail grizzly to a small hopper from which a belt feeder discharges to an



Jaw crusher used at the road gravel plant.

Elevator and vibrating screen at road gravel plant.



Scraper operating in pit at larger plant.

The gasoline-driven hoists operating scrapers at larger plant.

18-in. belt conveyor on 150-ft. centers. This conveyor discharges through a 1¼-in. rail grizzly into another small hopper which feeds onto a 24-in. belt conveyor on 105-ft. centers to the screening plant. The material rejected by the grizzly goes to a Cedar Rapids 9-in. by 16-in. jaw crusher which discharges onto the same belt conveyor.

The conveyor discharges at the top of the plant into a Universal 4-ft. by 18-ft. revolving screen where the material is also washed. This has 1- and 2-in. perforations on the main jacket and a 7-ft. sand jacket with 4 ft. of ½-in. cloth and 3 ft. of ⅛-in. by ½-in. mesh cloth. The oversize from this screen is taken back to the crusher by a belt conveyor. All sized material goes from the screen directly into the four-compartment timber bin which has a total capacity of 200 cu. yd. Trucks are loaded through side segmental gates, those for gravel having slotted chutes for rewashing.

The Sauerman scraper is operated by a Novo 1-cu. yd. double-drum hoist with a 50-hp. gasoline engine of the same make. The field conveyor, return conveyor and crusher are all belt or gear driven from the power take-off pulley of a 50-hp. Huber tractor. The feeder is driven by chain from the tail pulley of the field conveyor. The conveyor to the plant is belt and gear driven by a Novo 2-cylinder 10-hp. gasoline engine and the revolving screen is gear driven by a 6-hp. engine of the same make. Water for this plant is furnished from the nearby river by an American 6-in. centrifugal pump which is belt-driven by a 50-hp. Huber tractor. Stearns roller-bearing idlers are used on all conveyors.

Field conveyor discharging over grizzly to jaw crusher at large plant. Conveyor to plant and return conveyor at left.

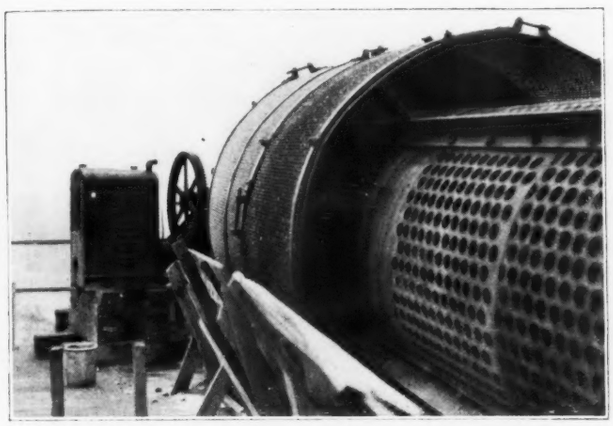
Loading sized material into truck from stockpile.

The road gravel plant is several hundred feet from the main plant and operates in a dry pit. A ¾-cu. yd. Sauerman Crescent scraper is operated by a Novo two-drum hoist, with a 50-hp. engine, similar to the hoist at the main plant. The gravel is discharged through an 8-in. rail grizzly onto an Atlas portable belt conveyor. This discharges onto a Simplicity 3-ft. by 6-ft. double deck vibrating screen with 1-in. mesh wire cloth on the top deck and ⅛-in. by ½-in. cloth on the bottom deck. The gravel over 1 in. in size is chuted to a Reliance 10-in. by 20-in. jaw crusher for reduction. The crushed

gravel is returned to the screen by a chain bucket elevator. The sand passing through the bottom deck of the screen is wasted and the ⅛-in. to 1-in. gravel drops to a 25-cu. yd. capacity timber storage bin from which it is loaded into trucks for shipment.

The belt conveyor is belt driven by a two-cylinder, 12-hp. Novo engine, the screen is Texrope driven by a one-cylinder 4-hp. Novo engine and the crusher and elevator by another 50-hp. Huber tractor. This plant has a capacity of 30-cu. yd. per hour.

The market conditions in the territory served by this plant during the past year were just the opposite of those prevailing in most other sections of the country. The amount of material required for



Revolving sizing screen and gasoline motor driving belt conveyor.

construction work far overbalanced the amount for road work. Because of this condition the scraper and hoist were moved to the main plant late in the summer and used in conjunction with the other unit for the balance of the season. As this plant never was taxed to its capacity by the single scraper the double unit worked very satisfactorily. Leschen Red Strand wire rope is used on both hoists and Ludlow-Saylor wire cloth on the sand jacket of the rotary screen and on both decks of the vibrating screen.

Left to right: Leo Shadduck, foreman; E. J. Scarlett, vice-president; A. J. Earl, president; and C. A. Myers, book-keeper.

Any stone too large to pass through the grizzlies at either plant is broken up with sledges. A few changes are to be made in the spring. These include the purchase of the gasoline shovel previously mentioned and the installation of a Telsmith reciprocating plate feeder to replace the one now used under the field hopper of the main plant. Stockpiling of excess sized material or road gravel is done with trucks by building ramps of timber as the size of the piles increase. As can be seen in one of the accompanying illustrations some very sizeable stockpiles have been built up in this manner. The material is recovered and loaded into trucks by a Barber-Greene Size 42 gasoline-driven stockpile loader.

The office of Scarlett & Earl, Inc., is at the plant. Officers are: A. J. Earl, president and treasurer; E. J. Scarlett, vice-president and general manager; and J. C. Foster, secretary.

Crusher-Bearing Troubles

(Continued from page 76)

erally, it is necessary to employ a bearing metal of the harder-bodied type in order to assure freedom from frequent repairs.

In the case of a sprung shaft, until the trouble has been remedied, the softest possible babbitt metal is superior to the metals that are best when conditions are normal. In such a case, use the ordinary No. 1 hardware babbitt which can be had for 8 to 10c per pound. It, being softer of body, will yield and adapt itself to the irregularity easily and will distribute the load over a larger area and so reduce the friction and heat.

When metal squeezes out while the bearing is not above normal temperature, its body is too soft to permanently stand up under the work. Use of a harder-bodied metal will cure such cases. When the metal squeezes out after the bearing has run hot attention should be given to lubrication, except when the shaft is sprung.

Because advertising matter about bearing metals has been to the effect that some one metal is suitable for almost every purpose, most of us hold that unconscious impression. It is wisdom to discard it. Different situations might be defined as demanding soft, hard or extra hard metal. No single alloy is all three. To obtain economical results up to modern standards, until one knows exactly which metal is most serviceable, the operator should submit his matter to a manufacturer of metals who understands crusher bearings.

Production of Slate Decreased 33 Per Cent in 1930

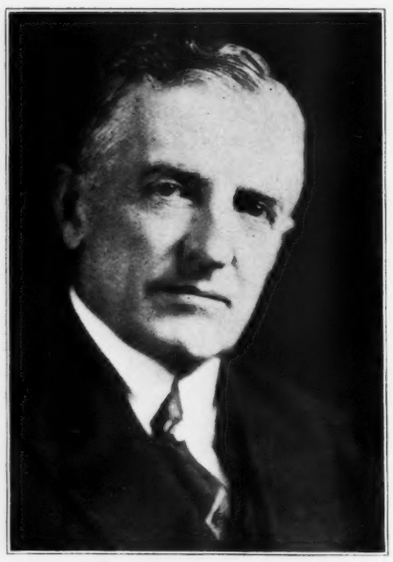
The slate sold at the quarries of the United States in 1930 was approximately 450,000 short tons, valued at $7,550,000, according to estimates furnished by producers to the United States Bureau of Mines. This was a decrease of 33 per cent in both quantity and value from the output reported for 1929—670,070 short tons valued at $11,245,178.

The roofing slate sold in 1930, estimated at 323,000 squares and valued at $3,200,000, decreased 30 per cent in quantity and 35 per cent in value from 1929.

Road Builders Optimistic Over Prospects for Prosperity of Industry

Annual Convention and Exposition at St. Louis Draws Attendance of 25,000

THE twenty-eighth annual convention and exposition of the American Road Builders' Assn. proved an attraction that brought together, at St. Louis, Mo., influential men —and some women—from the nations of the globe. A disinterested visitor could not fail to be impressed with the assertion made by various speakers on the program that this was a gathering of representatives of the world's leading industry. At the last or business session of the convention, the officers announced that the equipment display was larger than at any previous show, and that the attendance up to that time (next to the last day) was about 25,000, approximately the same as last year at Atlantic City. These proofs of such a successful gathering did much to raise one's optimism concerning the retreat of the recent universal depression in business. Exhibitors appeared satisfied with the results of their efforts during the five days, January 12 to 16, inclusive.



Wm. R. Smith, new president of the American Road Builders' Assn.

This same enthusiasm pervaded the address of the chief speaker on the banquet program, Floyd Gibbons, the famous war correspondent, globe trotter, and radio broadcaster, but in no wise connected with road-building activities. In the course of his talk, after his salutation, "Hello, everybody," he explained his serious intention of furthering the promotion and early construction of an international highway to unite the two Americas, his present plan comprehending a personal reconnaissance, this coming year, through the southern republics for a feasible route.

The exhibits of more than three hundred manufacturers of road-building machinery, supplies and materials covered the entire floor space of three huge structures known as the Arena, in the western outlying portion of St. Louis. Beautiful weather prevailed, and transportation service was excellent from and to the downtown section of the city. The association maintained headquarters at the Arena as well as in one of the downtown hotels, the Statler. The city's housing facilities proved ample for this unusual visitation.

All the meetings were held in five rooms that had been provided specially in the Arena, so that delegates could easily intersperse their sightseeing with serious contemplations of the many phases of highway construction and maintenance that was discussed in the sessions.

Visiting ladies were entertained by as many functions as they could well attend. These included a reception in the Statler Hotel, two sight-seeing tours of the city, a theater party, a shopping tour, luncheons in a department store and at a hotel, a matinee, a bridge party and, of course, participation with the gentlemen in the annual banquet and the international ball.

The opening session, Monday morning included

M. A. Coroalles

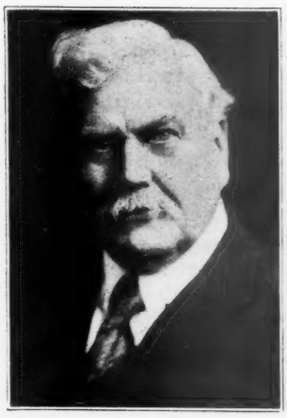
Geo. B. Sowers

James H. MacDonald

Otto Hess

Samuel Eckels

G. F. Beatty



Samuel Hill

Henry G. Shirley

a welcome from Mayor Victor J. Miller, addresses by Thomas H. MacDonald, chief, U. S. Bureau of Public Roads, and President W. A. Van Duzer, of the Association, and a general discussion of methods for coping with the problem of unemployment.

L. O. Marden, vice-president of the County Highway Officials' Division, conducted one Monday afternoon session which was devoted to county-highway matters with addresses by engineers from numerous states. W. W. Mack, chief engineer, Delaware State Highway Dept., presided at a second session which discussed highway finance and administration. A third session, conducted by John D. Waldrop, state highway engineer for North Carolina, discussed traffic devices, steel forms, and weighing devices. The Pan-American delegates held still another meeting.

The annual smoker was held Monday evening in the Statler Hotel.

Four sessions were held simultaneously Tuesday morning. President Henry H. Blood, Salt Lake City, of the American Assn. of State Highway Officials, presided at one meeting on highway location. Harry H. Blee, director of Aeronautic Development, U. S. Dept. of Commerce, presided at another meeting that discussed airport drainage and surfacing. J. X. Galvin, president, Pennoyer Merchants Despatch, Chicago, conducted a session on motor freight. A session on contractors' problems was under the chairmanship of William R. Smith, president, Lane Construction Corp., Meriden, Conn.

Five sessions were held Tuesday afternoon. Mr. Galvin presided at another session devoted to motor freight. The problems encountered by city officials were the main topic at a session under the direction of Col. C. E. Myers, president of the Association's City Officials' Division. A county highway officials' session was under the chairmanship of Stanley Abel, president of the Association's County Highway Officials' Division. A. H. Hinkle, supt. of maintenance, Indiana State Highway Commission, presided at one session devoted to construction and maintenance methods for low-cost roads and bridges. "The Future of Highway Contracting" was the topic of a symposium conducted by A. E. Horst, president, Associated General Contractors of America, Washington, D. C.

Four simultaneous sessions were held Wednesday forenoon. A. T. Goldbeck, director, Bureau of Engineering, Natl. Crushed Stone Assn., presided at one session on subgrades and pavement bases. Samuel Eckels, chief engineer, Pennsylvania Dept. of highways, presided at a session on snow removal and equipment. Grading methods and equipment were considered in a session conducted by B. E. Gray, former state maintenance engineer, West Virginia State Highway Commission. Mr. De Glopper, materials and equipment engineer, Michigan State Highways Dept., presided at the session on methods of purchasing equipment.

Wednesday afternoon also had four sessions. Grade crossings served as the topic at one session conducted by E. W. James, chief, Division of Transportation, U. S. Dept. of Public Roads. Another meeting of highway officials was under the direction of W. O. Washington, Brownsville, Tex., vice-president of the Association's County Highway Officials Division. Col. C. E. Myers presided at another session of city officials. C. P. Owens, maintenance engineer, Missouri State Highway Dept., conducted a session on maintenance equipment.

The annual banquet was held Wednesday evening, in the Gold Room of the Jefferson Hotel. Approximately 650 guests attended, enjoyed the repast and listened to several short reports and addresses which preceded the Floyd Gibbons feature.

Charles H. Davis, president of the National Highways Assn., New York, N. Y., proposed the issuance of six billion dollars in Federal bonds and a like amount of state and county bonds, to finance a 600,000-mile road-construction program which, he asserted, would solve the country's unemployment problem and afford an adequate system of rural "feeder" roads to supplement the state and national highways.

Several of the men who were termed "old timers" because of their attendance at every annual meeting for the past fifteen to twenty-eight years, were introduced. Among these was "Uncle" James H. MacDonald, treasurer of the association, consulting road expert of New Haven, Conn., 80 years old, and a road builder for fifty years.

Three sessions were held Thursday forenoon. At one session most of the speeches were delivered in

Spanish, it being allotted to the Pan-American Division. M. A. Coroalles, chief engineer of roads and bridges for Havana, Cuba, and president of this division, conducted the meeting. H. F. Thomson, vice-president, General Material Co., St. Louis, presided at a session on central- and truck-mixed concrete. A session for the consideration of highway guard rails was conducted by H. G. Shirley, state highway commissioner, Richmond, Va.

The county-highway officials held one session Thursday afternoon to review the reports and discussions of preceding sessions and to endorse recommendations for the coming year's program. The city-highway officials held a similar session.

The two sessions were followed by the Association's annual business meeting. Resolutions were passed urging increased highway construction and deploring the practice of diverting gasoline taxes and license fees to other than road-building purposes.

William R. Smith, president of the Lane Construction Co., Meriden, Conn., was elected to succeed W. A. Van Duzer as president.

Otto Hess, engineer-manager of the Kent County (Mich.) Roads Commission was elected to succeed Stanley Abel, of Taft, Cal., as president of the County Highway Officials' Division.

George B. Sowers, deputy commissioner of engineering, Cleveland, O., succeeds Col. C. E. Myers, director of transit, Philadelphia, Pa., as president of the City Officials' Division.

James H. MacDonald was returned to his office as treasurer of the Association.

Samuel Eckels, chief engineer, Pennsylvania Dept. of Highways, succeeds J. R. Draney, National Traffic Products, Inc., Washington, D. C., as vice-president of the northeastern district; H. G. Shirley, state highway commissioner, Richmond, Va., was re-elected vice-president of the Southern Dist.; S. F. Beatty, president, Austin-Western Road Mchy. Co., Chicago, was re-elected vice-president of the Central Dist., and Samuel Hill, honorary life president, Washington Good Roads Assn., Seattle, was re-elected vice-president of the Western Dist.

The following were elected as directors of the Association to serve three years:

H. K. Bishop, chief, division of construction, U. S. Bureau of Public Roads, Washington, D. C.

Robert B. Brooks, director of streets and sewers, St. Louis, Mo.

Paul L. Griffith, vice-pres., American Tar Products Co., Pittsburgh, Pa.

A. Lee Glover, secy., New Jersey Highway Dept., Trenton, N. J.

Richard Hopkins, contractor, Troy, N. Y.

J. E. Pennybacker, managing director, The Asphalt Institute, New York, N. Y.

H. C. Whitehurst, engineer of highways, Dist. of Columbia, Washington, D. C.

The officers will be installed into their respective offices at a meeting to be held next May in Washington, D. C. At that same meeting the location of next year's convention and show will be settled, invitations having been received from Houston, Tex.; Cleveland, O., and Chicago, Ill.

Operates Small Drag-Scraper Plant Near Greenville, Ill.

ABOUT four years ago the Miller Investment Co. of Greenville, Ill., established a small sand-and-gravel plant to serve the unusually large hard-surfaced road program that was then under way in the vicinity and, although it was intended for temporary service the company "has come to like the business so well we are still in it and are not doing so bad at that for such a small city," to quote W. F. McLain, manager of the company. The product has a good reputation and a good market, serving a trucking trade; the plant itself, while a small one, is well planned and is particularly interesting in the advantage taken of gravity to move the materials wherever possible.

The gravel bed has a thickness varying from 70 to 80 ft., and is covered with overburden 4 to 8 ft. thick. This topsoil is stripped with a ½-cu. yd. Sauerman drag scraper. The sand and gravel is fed to the plant by a ⅓-cu. yd. drag scraper which, as the digging thus far has been within about 100 ft. of the plant, has easily kept up with the requirements.

Drag scraper feeding material up ramp to screens at the Miller plant.

Sand and gravel fed from the pit is fed to a shaker screen, and the oversize drops to a crusher, the product of which is returned to join the undersize on a Link-Belt feeder. This delivers the material to a 50-ft. belt conveyor on which the material is raised to an elevation of about 20 ft.; at this point it drops into a trough and is sluiced down to a screen that removes the sizes over ¼-in. Sand and water drop to another trough and are carried to a Link-Belt screw washer in which the sand is washed and dewatered. The washer delivers the sand to another belt conveyor which in turn carries the clean sand to the stock pile.

This simple plant can handle about 30 tons per hour. It has recently been electrified and is so automatic in its operation that Mr. McLain writes that only one man is needed for its operation.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

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W. H. L. McCOURTIE
President
Trinity Portland Cement Co.
Dallas, Tex.

Personal Mention

W. T. Walsh, formerly with Day & Maddock, Inc., Cleveland, O., contractor equipment dealers, announces the formation of the W. T. Walsh Equipment Co., Inc., with offices in the Central United Bank Bldg., Cleveland. Mr. Walsh is well known in Ohio and nearby states. He has been with Day & Maddock since its inception in 1917 and has served as its treasurer for the past six years. He has been active also in the Associated Equipment Distributors organization as a member of the executive committee for the past three years and as chairman of the membership committee.

The new company deals in new and used equipment for quarries, sand and gravel plants and contractors.

W. C. Davis, president of Foote Bros. Gear and Machine Co., Chicago, recently returned from an eastern trip, during which he visited the company's exhibit at the New York Power Show and reports a big attendance and active interest in the exhibits. Mr. Davis declares that business is being booked by the company in satisfactory volume and states that, in his opinion, one of the best remedies for improvement of business conditions is a more optimistic attitude on the part of business leaders and executives, confidence in the future and the stability of the great industrial and financial structures of the country.

Harry Kleinhaus has been appointed representative for the Mid-West Locomotive Co., Hamilton, O., in the tri-state territory embracing western Pennsylvania, West Virginia, and eastern Ohio, with several counties in Maryland. His headquarters are 419 Union Trust Bldg., Pittsburgh, Pa.

Dr. O. E. Kiessling has been named chief economist of the Mineral Statistics Division and **W. W. Adams** chief statistician of the newly-created demographical division in the United States Bureau of Mines.

Dr. Kiessling succeeds Frank J. Katz, deceased, who had served as chief economist of the mineral-statistics division economic branch, for many years. Dr. Kiessling comes from Jefferson, Wis. Since 1927 he has been a member of the staff of the Economic Branch of the Bureau. He is the author or joint author of numerous Bureau reports on the economic phases of the mineral industry, and has contributed many articles to the technical and trade press.

Mr. Adams was first appointed to the government service from New Rochelle, N. Y. He became connected with the Bureau of Mines in 1911, but a few months after this branch of the

W. W. Adams

Federal service was organized. Until 1920 he served as assistant to the engineer in charge of the Bureau's statistical work relating to accidents in the mineral industries, and in that year was appointed chief of the section handling this phase of the Bureau's work. In addition to its regular statistical studies covering the various branches of mining, the division of which Mr. Adams is the head also conducts the annual safety contests known as The National Safety Competition, and it coöperates with the National Crushed Stone Assn. and the National Sand and Gravel Assn. in the conduct of annual safety contests among members of those associations.

J. D. Oliver, chairman of the board of directors of the Oliver Farm Equipment Co., has announced that **C. R. Messinger,** president of the Chain Belt Co., of Milwaukee, had been elected to the presidency of the Oliver Farm Equipment Co., effective January 1. Mr. Messinger and **W. C. Frye** of Milwaukee were elected to the board.

C. R. Messinger

C. R. Messinger has been active in the management of the Chain Belt Co. for the past fourteen years. He has been chairman of the board of the Sivyer Steel Casting Co. of Chicago and Milwaukee, vice-president of the Federal Malleable Co. of Milwaukee and a director in these firms as well as of the Interstate Drop Forge Company of Milwaukee, and The Stearns Conveyor Company of Cleveland, Ohio.

Roy M. Nelson has been named representative in Illinois, Indiana, and parts of Wisconsin and Michigan, by the Mid-West Locomotive Co. Mr. Nelson's headquarters are at 122 So. Michigan Ave., Chicago. He was formerly connected with the Fate-Root-Heath Co. in the sale of Plymouth locomotives.

C. H. Keeney has been appointed sales manager by the Northern Blower Co., Cleveland, O. Mr. Keeney has been successfully identified with this line of manufacture for about twenty-five years.

H. W. Hardinge, president of the Hardinge Co., sailed January 4 on the *Mauretania* for Europe, to be gone some 6 or 8 weeks on business.

M. B. Urquhart, 509 Seventeenth St., Denver, Colo., well known for many years among mining men, quarry men and other users of machinery, has a penchant for distributing among his friends cards with pithy poems. The verses have nothing to do with his business which is simply lubricants. Among recent issues are cards entitled "The Unemployed," "Too Much" and "Playing the Game."

Obituary

Charlton H. Pearson, for years in charge of the municipal crushed-stone plant at Victoria, B. C., died at a Victoria hospital recently at the age of 71. Mr. Pearson was a native of England and had lived in British Columbia for more than a quarter of a century. Besides his widow, he is survived by a daughter, one sister, and four brothers.

A. S. Welles, chairman of the Florida state railroad commission, died at his home in Tallahassee on Dec. 16. Mr. Welles was 65 years old and had been a member of the commission for ten years.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Lehigh Portland Cement Net Declines $631,483

Lehigh Portland Cement Co. has issued its report for year ended November 30, 1930, showing net income of $2,105,993, after depreciation, federal taxes, etc., equivalent, after dividends on 7 per cent preferred stock, to $1.46 a share (par $50) on 450,348 shares of common stock. This compares with $2,737,476, or $2.78 a common share, in preceding year.

Current assets as of November 30 amounted to $18,701,256 and current liabilities were $1,282,644, comparing with $18,873,223 and $1,910,106, respectively, on November 30, 1929.

Income account for year ended November 30, 1930, compares as follows:

	1930	1929
Sales	$16,699,886	$19,346,790
Costs	9,775,382	11,168,759
Depreciation	2,026,634	2,292,205
Expenses	3,049,504	3,569,781
Operating profit	$ 1,848,366	$ 2,316,045
Other income	514,911	736,590
Total income	$ 2,363,277	$ 3,052,635
Federal tax	257,284	315,159
Net profit	$ 2,105,993	$ 2,737,476
Preferred dividends	1,450,354	1,485,491
Common dividends	786,160	1,124,066
Deficit	$ 130,521	*$ 127,919

* Surplus.

Explains Financial Plan of Asbestos Corporation

Col. Robert F. Massie, president and general manager of Asbestos Corp., Ltd., in a letter to first-mortgage bondholders of the company, urges that representation be arranged for at meeting to be held January 29, at which action is to be taken on proposal to defer interest and sinking fund payments. Vote of 65 per cent of the outstanding bonds is required for deferment of interest payments.

Col. Massie's letter explains in detail difficulties which have surrounded company, including increased competition, price cutting, etc., and outlines steps taken to improve position of company. The letter continues:

"The net outcome has been a further depletion of the cash position of the corporation, but the development work being done is putting the corporation in such a position that, by the middle of 1931, it will be better able to cope with competition than at any time during recent years."

In commenting further on the outlook, Col. Massie says: "The changes in mining and milling, the economies effected and the partial development, since August, 1929, of new known richer ore bodies have very materially improved the position of the corporation for future years' operations, and the management is of the opinion that were world business conditions such that this corporation could run to full capacity it could, even at prevailing prices, make substantial earnings, but with the present curtailment of business from all countries, the only course to pursue is to conserve the resources, fill immediate orders, and carry on, in a curtailed manner, such development work as is absolutely essential."

Construction Materials Corp. Net to Exceed $2

Construction Materials Corp. of Chicago, Ill., while reporting a considerable decline in net for 1930, will show substantially over $8 a share earned on its convertible preferred stock, and after preferred dividends of $3.50 a share, more than $2 a share will remain on the 185,000 shares of common outstanding, according to officials.

These earnings compare with $12.82 and $3.98 on preferred and common, respectively, in 1929, and $13.41 and $4.02 in 1928. Net for 1930, however, does not include the company's share of earnings of the Moulding-Brownell Corp., recent $10,000,000 merger of middle-west sand-and-gravel and crushed-stone producers and building-material concerns, in which Construction Materials has an interest understood to approximate 50 per cent.

Earnings of Moulding-Brownell Corp. according to authentic reports, will add around $1.60 a share to common-stock earnings of Construction Materials.

Principally accountable for the decline in Construction's income during 1930 was the delay encountered in completion of its $2,000,000 turbine motor ship, the *J. R. Sensibar*, the largest material-handling plant afloat on the Great Lakes, and also delays in finishing of its huge sand-and-gravel plant at Ferrysburg, Mich.

Added to these difficulties were the delay in awarding of paving contracts, which prevented its subsidiary, R. F. Conway Co., from contributing its proportionate share of income, and the general falling off in business, which caused two large industrial contracts to be deferred.

At present the company is in position to take advantage of a pickup in business. The *J. R. Sensibar*, with a capacity of 10,000 tons, suitable for carrying dry cargo as well as for reclaiming submerged riparian land, will enable the company to compete for contracts on an exceedingly favorable basis.

It is expected that work on the two deferred contracts will be resumed, and that the company will receive other contracts from industrial corporations which have held off during the slow business period.

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable
American Aggregates	Preferred	1¾% qr.	Dec. 20	Jan. 2
Bessemer Limestone & Cement	Class A	$0.75 qr.	Jan. 20	Feb. 1
Boston Sand and Gravel	Preferred	$0.87½ qr.	Dec. 22	Jan. 2
Boston Sand and Gravel	Common	$0.40 qr.	Dec. 22	Jan. 2
Calaveras Cement	7% Pfd.	1¾% qr.	Dec. 30	Jan. 15
Cleveland Builders Supply	Common	$0.50 qr.	Dec. 15	Jan. 2
Consolidated Okla. Sand and Gravel	Preferred	1¾% qr.	Dec. 27	Jan. 2
Construction Materials	Preferred	$0.87½ qr.	Jan. 20	Feb. 1
Consumers Co	Pr. Pfd.	$1.50 qr.	Dec. 15	Jan. 2
Coronet Phosphate Co	.....	$2.00 qr.	Dec. 14	Jan. 2
Dolese and Shepard	.....	$2.00 qr.	Dec. 20	Jan. 2
Dufferin Pav. and Crushed Stone	7% Pfd.	1¾% qr.	Dec. 17	Jan. 2
Gypsum, Lime & Alabastine of Canada, Ltd.	Common	$0.20 qr.	Dec. 24	Jan. 2
Ideal Cement Co	Common	$1.75 qr.	Dec. 13	Jan. 2
Illinois Brick	.....	$0.60 qr.	Jan. 2	Jan. 15
Johns Manville	Preferred	$1.75 qr.	Dec. 11	Jan. 2
Johns Manville	Common	$0.75 qr.	Dec. 25	Jan. 15
Kelley Island Lime & Transport	Common	$0.62½ qr.	Dec. 20	Jan. 2
Kentucky Consolidated Stone	Preferred	$1.75 qr.	Jan. 15	Feb. 1
Kentucky Rock Asphalt	Common	$0.40 qr.	Dec. 15	Jan. 2
Medusa Portland Cement	Preferred	1½% qr.	Dec. 24	Jan. 2
Medusa Portland Cement	Common	$1.50 qr.	Dec. 24	Jan. 2
Metropolitan Paving Brick	Preferred	$1.75 qr.	Dec. 15	Jan. 2
National Gypsum Co	Preferred	$1.00	Dec. 22	Jan. 2
New York Trap Rock	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Pacific Portland Cement	Preferred	$1.62½ qr.	Dec. 31	Jan. 5
Peerless Cement	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Pennsylvania Salt	Common	$1.25 qr.	Dec. 30	Jan. 15
Raymond Concrete Pile	Preferred	$0.75 qr.	Jan. 20	Feb. 1
Raymond Concrete Pile	Common	$0.50 qr.	Jan. 20	Feb. 1
Riverside Cement Co	Preferred	$1.50 qr.	Jan. 15	Feb. 1
Riverside Cement Co	Class A	$0.15 qr.	Jan. 15	Feb. 1
Santa Cruz Portland Cement	.....	$1.00 qr.	Dec. 24	Jan. 2
Sterling Salt	Common	$0.50 qr.	Dec. 24	Jan. 2
Superior Portland Cement	Class A	$0.27½M	Dec. 23	Jan. 2
Warner Co	1st Pfd.	$1.75 qr.	Dec. 15	Jan. 2
Warner Co	2nd Pfd.	$1.75 qr.	Dec. 15	Jan. 2
Warner Co	Common	$0.50 qr.	Dec. 30	Jan. 15
Worcester Salt	7% Pfd.	$1.75 qr.	Dec. 26	Jan. 2

Latest Portland-Cement Statistics

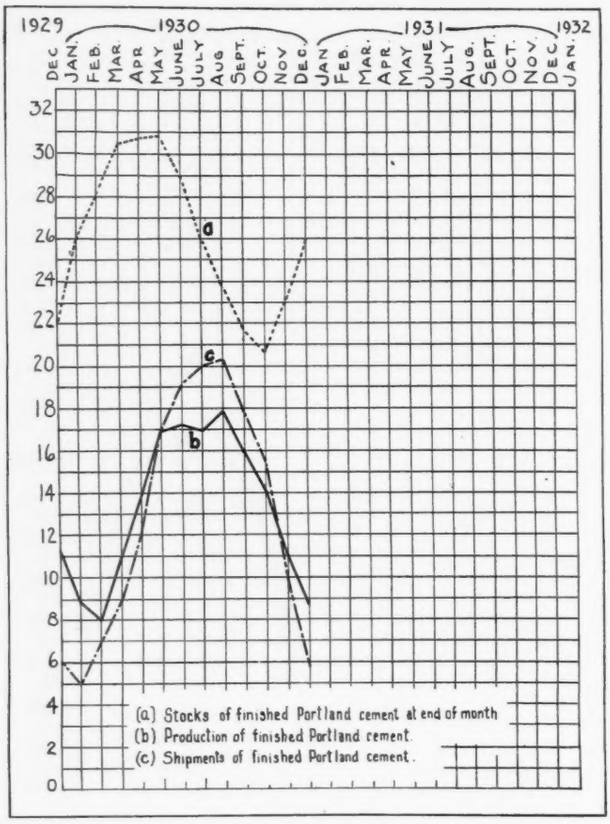


Chart showing production, shipments and stocks on hand, by months, from December, 1929, to December, 1930.

The Portland-cement industry in December, 1930, produced 8,480,000 bbl., shipped 5,688,000 bbl. from the mills, and had in stock at the end of the month 25,848,000 bbl. Production of Portland-cement in December, 1930, showed a decrease of 24.4 per cent and shipments a decrease of 4.4 per cent, as compared with December, 1929. Portland-cement stocks at the mills were 9.8 per cent higher than a year ago. The preliminary totals for 1930 show decreases of 5.7 per cent in production and 6.5 per cent in shipments from the final totals for 1929 as given on page 5.

The statistics here presented are compiled from reports for December, received by the Bureau of Mines from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN NOVEMBER, 1930

Exported to—	Barrels	Value
Canada	3,385	$13,975
Central America	11,708	22,945
Cuba	4,266	11,332
Other West Indies and Bermuda	5,253	12,387
Mexico	4,318	15,458
South America	18,726	59,189
Other Countries	2,839	16,269
Total	50,495	151,555

DISTRIBUTION OF CEMENT

Shipped to—	October		November	
	1929	1930	1929	1930
Alabama	172,980	88,358	132,035	67,219
Alaska	662	697	396	158
Arizona	52,544	33,524	43,145	31,593
Arkansas	190,656	144,307	133,371	89,411
California	1,075,308	931,721	943,641	666,196
Colorado	97,352	78,683	32,910	41,748
Connecticut	229,221	153,822	178,005	113,957
Delaware	36,005	20,017	28,275	17,889
District of Columbia	104,051	154,670	99,047	84,931
Florida	106,271	89,354	111,127	74,271
Georgia	124,215	174,340	121,871	103,952
Hawaii	22,716	23,850	26,788	17,979
Idaho	28,709	34,385	17,468	13,538
Illinois	1,406,895	1,586,016	782,779	655,302
Indiana	686,986	321,285	326,534	160,458
Iowa	716,047	317,288	127,446	98,047
Kansas	336,060	226,472	159,803	153,458
Kentucky	178,287	223,805	107,310	102,299
Louisiana	245,643	172,194	152,054	133,845
Maine	80,564	87,454	52,865	53,127
Maryland	291,625	257,617	233,983	119,436
Massachusetts	365,195	376,533	225,482	248,481
Michigan	1,161,054	867,458	588,511	407,866
Minnesota	352,958	237,592	130,411	89,729
Mississippi	99,934	39,377	71,069	34,044
Missouri	681,598	713,573	396,019	413,025
Montana	55,468	27,189	16,035	20,597
Nebraska	213,158	174,005	61,548	68,717
Nevada	15,028	18,751	8,173	6,681
New Hampshire	67,001	48,117	37,526	24,958
New Jersey	911,203	664,381	678,291	403,664
New Mexico	28,479	27,047	15,557	17,445
New York	2,295,014	2,063,858	1,441,207	1,233,534
North Carolina	147,399	101,403	110,928	63,911
North Dakota	42,474	24,513	9,564	7,734
Ohio	1,218,439	1,011,292	638,120	614,013
Oklahoma	376,193	270,430	261,283	195,644
Oregon	114,228	130,953	78,363	87,098
Pennsylvania	1,550,799	1,351,511	1,022,410	517,568
Porto Rico	5,195	5,000	3,520	125
Rhode Island	78,405	76,031	58,690	34,865
South Carolina	88,492	273,208	70,756	177,632
South Dakota	94,859	44,410	22,438	17,948
Tennessee	330,340	271,922	228,476	117,871
Texas	759,309	438,457	475,332	454,199
Utah	60,619	38,549	37,616	21,142
Vermont	109,422	53,087	43,012	21,939
Virginia	152,804	155,410	120,589	102,029
Washington	240,543	324,276	158,675	262,159
West Virginia	168,957	139,483	103,156	105,304
Wisconsin	597,697	414,797	224,480	157,633
Wyoming	28,708	20,691	9,346	8,763
Unspecified	28,000	40,039	.....	13,633
	18,621,769	15,563,202	11,157,436	8,748,765
Foreign countries	73,231	35,798	64,564	35,235
Total shipped from cement plants	18,695,000	15,599,000	11,222,000	8,784,000

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN NOVEMBER, 1930

Imported from—	District into which imported	Barrels	Value
Belgium	Massachusetts	29,795	$31,640
	New York	6,312	5,867
	Porto Rico	3,021	5,600
	Total	39,128	43,107
Canada	Maine and New Hampshire	140	402
	Porto Rico	2,845	3,532
	Total	2,985	3,934
Denmark	New York	23,857	23,391
	Porto Rico	9,807	10,586
	Total	33,664	33,977
France	Massachusetts	739	1,783
Germany	Los Angeles	4,897	9,485
Japan	Hawaii	1,430	1,515
United Kingdom	New York	5,020	9,379
	Philadelphia	21,261	22,268
	Total	26,281	31,647
	Grand Total	109,124	125,448

RELATION OF PRODUCTION TO CAPACITY

	December		November 1930 (per cent)	October 1930 (per cent)	September 1930 (per cent)
	1929 (per cent)	1930 (per cent)			
The month	51.5	38.2	51.7	65.4	75.7
The 12 months ended	66.4	61.5	62.6	64.2	65.2

SUMMARY OF MONTHLY ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT IN 1930, BY DISTRICTS

(In thousands of barrels)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1930	1929
Production														
Eastern Pa., N. J. and Md	2,286	2,033	2,717	3,067	3,707	3,397	3,566	3,676	3,273	2,793	2,390	1,939	34,844	37,727
New York and Maine	320	187	618	999	1,176	1,271	1,249	1,396	1,238	1,220	924	716	11,314	11,419
Ohio, Western Pa. and W. Va.	727	762	1,205	1,458	2,112	1,924	1,973	2,009	1,873	1,655	1,085	769	17,552	17,936
Michigan	346	543	383	562	1,419	1,487	1,410	1,426	1,242	1,130	943	614	11,505	13,749
Wis., Ill., Ind. and Ky	1,377	883	1,129	1,366	2,143	2,336	2,255	2,409	2,171	1,938	1,233	984	20,224	21,378
Va., Tenn., Ala., Ga., Fla. and La	842	727	1,099	1,262	1,306	1,316	1,213	1,232	1,198	1,132	877	680	12,884	13,793
Eastern Mo., Ia., Minn. and S. Dak	758	748	971	1,415	1,763	1,987	1,832	1,933	1,748	1,591	1,131	906	16,783	15,697
Western Mo., Neb., Kans., Okla. and Ark.	701	709	945	1,160	1,360	1,322	1,405	1,361	1,233	957	743	700	12,596	12,393
Texas	321	482	694	757	630	558	585	697	679	484	502	392	6,781	7,374
Colo., Mont., Utah, Wyo. and Idaho	0	130	240	286	314	300	217	302	260	134	40	34	2,257	2,695
California	718	755	873	838	926	955	1,009	922	806	953	817	531	10,103	13,092
Oregon and Washington	102	203	351	351	393	386	364	458	403	423	413	215	4,062	3,393
	8,498	8,162	11,225	13,521	17,249	17,239	17,078	17,821	16,124	14,410	11,098	8,480	160,905	170,646
Shipments														
Eastern Pa., N. J. and Md	1,388	1,419	2,311	3,127	3,746	3,903	4,085	4,161	3,813	3,535	2,124	1,469	35,081	37,647
New York and Maine	249	257	472	839	1,191	1,381	1,524	1,560	1,467	1,201	617	364	11,122	11,520
Ohio, Western Pa. and W. Va	472	651	724	1,375	1,974	2,119	2,358	2,338	1,984	1,704	830	467	16,996	17,737
Michigan	234	297	411	702	1,229	1,459	1,604	1,627	1,381	1,093	538	245	10,820	13,326
Wis., Ill., Ind. and Ky	327	664	696	1,265	2,026	2,552	2,916	3,045	2,716	2,115	857	394	19,573	21,171
Va., Tenn., Ala., Ga., Fla. and La	730	881	970	1,239	1,192	1,180	1,327	1,328	1,178	1,248	807	648	12,728	14,047
Eastern Mo., Ia., Minn. and S. Dak	214	492	502	1,230	2,184	2,412	2,540	2,491	2,116	1,618	739	337	16,875	15,984
Western Mo., Neb., Kans., Okla. and Ark.	271	764	838	1,264	1,390	1,404	1,442	1,412	1,227	947	632	367	11,958	12,267
Texas	317	521	627	776	620	706	709	634	599	469	453	362	6,793	7,084
Colo., Mont., Utah, Wyo. and Idaho	42	104	163	262	290	296	276	292	258	227	118	46	2,374	2,766
California	640	793	816	921	980	951	946	961	905	1,006	728	755	10,402	12,965
Oregon and Washington	71	169	296	340	402	418	426	450	439	436	341	234	4,022	3,354
	4,955	7,012	8,826	13,340	17,224	18,781	20,153	20,299	18,083	15,599	8,784	5,688	158,744	169,868

SUMMARY OF ESTIMATES OF STOCKS OF FINISHED PORTLAND CEMENT AT END OF EACH MONTH IN 1930, BY DISTRICTS

(In thousands of barrels)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Eastern Pa., N. J. and Md	6,075	6,689	7,095	7,037	6,998	6,513	5,992	5,509	4,966	4,255	4,521	4,991
New York and Maine	1,615	1,556	1,702	1,862	1,847	1,737	1,462	1,298	1,069	1,088	1,395	1,748
Ohio, Western Pa. and W. Va	3,289	3,401	3,882	3,965	4,102	3,908	3,523	3,190	3,079	3,030	3,285	3,587
Michigan	2,509	2,761	2,734	2,595	2,785	2,812	2,618	2,418	2,279	2,317	2,722	3,091
Wis., Ill., Ind. and Ky	3,926	4,145	4,578	4,691	4,808	4,591	3,931	3,295	2,751	2,546	2,922	3,512
Va., Tenn., Ala., Ga., Fla. and La	1,753	1,598	1,728	1,751	1,865	2,001	1,889	1,794	1,814	1,697	1,767	1,799
Eastern Mo., Ia., Minn. and S. Dak	3,140	3,396	3,864	4,049	3,628	3,203	2,495	1,937	1,569	1,542	1,934	2,503
Western Mo., Neb., Kans., Okla. and Ark.	1,889	1,834	1,941	1,837	1,807	1,725	1,688	1,637	1,643	1,652	1,763	2,095
Texas	817	778	845	825	836	688	564	627	707	721	769	799
Colo., Mont., Utah, Wyo. and Idaho	415	441	518	540	563	562	501	509	508	414	335	323
California	1,168	1,131	1,187	1,130	1,077	1,080	1,144	1,105	1,020	963	1,100	876
Oregon and Washington	485	519	574	585	575	544	482	505	484	472	543	524
	27,081	28,249	30,648	30,867	30,891	29,364	26,289	23,824	21,889	20,697	23,056	25,848

SUMMARY OF MONTHLY ESTIMATES OF CLINKER (UNGROUND PORTLAND CEMENT) PRODUCED AND IN STOCK AT MILLS IN 1930, BY DISTRICTS

(In thousands of barrels)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1930	1929
Production														
Eastern Pa., N. J. and Md	2,546	2,415	3,120	3,264	3,543	3,270	3,211	3,273	2,919	2,470	2,235	2,052	34,318	37,299
New York and Maine	525	344	627	1,081	1,067	1,123	1,124	1,136	1,180	1,183	1,030	853	11,273	11,049
Ohio, Western Pa. and W. Va.	999	1,041	1,341	1,640	1,988	1,854	1,667	1,511	1,622	1,525	1,263	992	17,443	17,692
Michigan	868	758	716	907	1,204	1,241	1,138	1,092	1,006	1,141	917	690	11,678	13,578
Wis., Ill., Ind. and Ky	1,586	1,539	1,626	1,829	2,197	2,099	1,854	1,858	1,665	1,706	1,337	1,109	20,405	21,547
Va., Tenn., Ala., Ga., Fla. and La	901	758	1,195	1,335	1,403	1,222	1,152	1,220	1,197	1,088	972	745	13,188	13,554
Eastern Mo., Ia., Minn. and S. Dak	790	893	1,255	1,547	1,802	1,776	1,606	1,608	1,627	1,590	1,092	950	16,536	15,646
Western Mo., Neb., Kans., Okla. and Ark.	805	796	1,031	1,199	1,272	1,282	1,330	1,279	1,194	992	885	807	12,872	12,105
Texas	400	451	656	643	596	485	550	701	653	522	498	393	6,548	7,601
Colo., Mont., Utah, Wyo. and Idaho	11	135	207	234	313	321	241	342	291	160	29	.....	2,284	2,591
California	926	701	877	946	858	899	891	860	861	1,091	1,002	607	10,519	12,780
Oregon and Washington	147	177	394	400	364	323	305	364	362	427	379	322	3,964	3,546
	10,504	10,008	13,045	15,025	16,607	15,895	15,069	15,244	14,577	13,895	11,639	9,520	161,028	168,988
Stocks (end of month)														
Eastern Pa., N. J. and Md	1,356	1,785	2,223	2,461	2,340	2,259	1,962	1,610	1,292	1,025	917	1,055	.....	.....
New York and Maine	813	970	987	1,081	986	849	740	496	453	430	547	694	.....	.....
Ohio, Western Pa. and W. Va	1,212	1,496	1,643	1,845	1,749	1,705	1,432	972	752	648	834	1,064	.....	.....
Michigan	1,152	1,371	1,705	2,053	1,847	1,613	1,351	1,027	800	819	793	871	.....	.....
Wis., Ill., Ind. and Ky	858	1,511	2,011	2,482	2,544	2,316	1,922	1,380	878	649	755	887	.....	.....
Va., Tenn., Ala., Fla. and La	732	770	879	964	1,074	980	928	917	925	876	964	1,028	.....	.....
Eastern Mo., Ia., Minn. and S. Dak	575	728	1,018	1,158	1,221	1,037	836	587	490	500	475	530	.....	.....
Western Mo., Neb., Kans., Okla. and Ark.	290	383	475	519	446	417	354	285	258	301	447	561	.....	.....
Texas	563	536	507	404	379	315	286	299	279	328	331	338	.....	.....
Colo., Mont., Utah, Wyo. and Idaho	254	258	235	183	184	206	229	270	302	329	305	272	.....	.....
California	1,315	1,261	1,268	1,406	1,315	1,231	1,109	1,004	961	1,025	1,081	1,127	.....	.....
Oregon and Washington	526	503	552	608	583	524	535	428	393	336	309	420	.....	.....
	9,646	11,572	13,503	15,164	14,668	13,452	11,684	9,275	7,783	7,266	7,758	8,847	.....	.....

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN NOVEMBER, 1930

	Barrels	Value
Alaska	207	$ 631
Hawaii	22,473	60,640
Porto Rico	1,453	3,011
	24,133	64,282

Traffic News and Comment

New Complaints Filed

Cement

The Missouri Portland Cement Co. and Dewey Portland Cement Co., interveners, have ask for reopening of I. C. C. Docket No. 22,239, Ash Grove Lime & Portland Cement Co., of Nebraska v. A. T. & S. F., et al., reported in PIT AND QUARRY Nov. 26th, and consolidation with Docket No. 22,691, Dewey Portland Cement Co., et al., v. A. T. & S. F., et al.

The Delaware and Hudson has ask the commission to dismiss complaint of the Glens Falls Portland Cement Co. v. B. & A., et al., Docket No. 24,-010, reported in PIT AND QUARRY, Dec. 17th, page 65.

Stone, Sand and Gravel

The Saluda Crushed Stone Co. has ask the commission to reopen docket No. 22,109, covering rates on crushed stone, sand, gravel and chert within the state of South Carolina.

Recent I. C. C. Decisions

Gypsum

The rate on gypsum from Arden, Nev., to Monolith, Cal., has been found unreasonable to the extent it exceeds or may exceed 12 cents per 100 lb., c.l. min. wt. 80,000 lb., and is unduly prejudicial to complainant and preferential of competing producers at Midland and Plaster City, Cal., to the extent it exceeds the corresponding rates contemporaneously applicable from Midland and Plaster City to Monolith. Reasonable and unprejudicial rates are to be effective not later than March 31st. I. C. C. Docket No. 23, 168, Blue Diamond Co., of Nevada v. A. T. & S. F., et al.

Examiners' Reports

Since the decision of the commission was published in the Florida cement rate case, 132 I. C. C. 427, The Florida Portland Cement Co. has established a plant at Tampa, and Examiner Money has recommended that the original finding be modified by changing the dividing line between standard and arbitrary territory. He proposes that the dividing line be established on the line of the A. C. L. from Jacksonville through Palatka, Orlando, and Lakeland to Plant City and thence on the line of the S. A. L. to Tampa, and that the standard basis of rates previously prescribed in this proceeding be established from, to, and between points on and north and west of this line in Florida, and that such standard basis plus the differentials named in the original decision be prescribed for application from, to, and between points in the territory south and east of this line, such arbitraries to be based upon the distance under the formula previously prescribed herein for the haul in arbitrary territory, and to accrue to the lines operating in such arbitrary territory, in addition to their division out of the through rates. The Florida Portland Cement Co. intervened in the case which was reopened at the request of producers outside of Florida. If the commission follows the examiner's proposal it will place the Florida plant at Tampa in the origin territory with the competing cement plants which objected to the adjustment caused by the refusal of the Florida Commission to allow the arbitrary basis to be applied on intrastate traffic in the manner prescribed for application on interstate traffic. I. C. C. Docket No. 15,806, Lehigh Portland Cement Co. v. A. & R., et al., and No. 15,806 Sub. 1, Tidewater Portland Cement Co. v. Same.

Rate Committee Dockets

TRUNK LINE ASSN.

Lime

Shippers at Bellefonte and Pleasant Gap, Pa., are asking for commodity rates on lime to Norristown (DeKalb St.), Pa., which are comparable to the rates from Bellefonte to Philadelphia. Rates ask on c.l. min. wt. of 30,000 lb. are, Building lime, 11½ cents; agricultural and land lime, 11 cents, and chemical, gas and glass lime, 11 cents per 100 lb. Docket No. 25,623.

Sand and Gravel

Rates on sand and gravel other than blast, engine, foundry, moulding or silica, c.l. min. wt. 90 per cent of marked capacity of car, from Alderd, N. Y., to Sierks, Johnsonburg, Java Center, Arcade, N. Y., A. & A. R. R. and various destinations, are proposed by shippers. Rates range from $1.20 to $1.30 per net ton and are comparable with rates to Belfast and Danville, N. Y. Docket No. 25,627.

CENTRAL FREIGHT ASSN.

Lime

Carriers propose to publish on lime from Mitchell, Ind., to Wisconsin Dam, Wis., rate of 22½ cents, c.l. min. wt. 30,000 lb., and rate of 20 cents per 100 lb. c.l. min. wt. 60,000 lb. The present rate is 24 cents, c.l. min. wt. 30,000 lb. Docket No. 27,176.

Limestone (ground)

Shippers are proposing cancellation of the commodity rates on limestone (crushed or ground) from Quincy and Marblehead, Ill., to points in Indiana, Michigan and Ohio named in Item 1,440 of W. T. L. Tariff 58-N, allowing the basis of 60 per cent of the sixth class rate provided in Item 1,670-A of C. F. A. Tariff 130-T to apply in lieu thereof. The present minimum weight is 90 per cent of the marked capacity of the car, and the minimum weight under Tariff 130-T is 60,000 lb. Present rates and rates which will result from the proposed basis are shown below. Docket No. 27,197.

To	Present	Proposed
Akron, O.	$0.19	$0.17½
Ashtabula, O.	.20	.18½
Cincinnati, O.	.16½	.15½
Cleveland, O.	.19	.17½
Columbus, O.	.18	.16½
Dayton, O.	.16½	.15½
Delphi, Ind.	.15	.14
Detroit, Mich.	.18	.17
Elkhart, Ind.	.16	.14½
Evansville, Ind.	.15	.14
Fort Wayne, Ind.	.16	.14½
Huntington, Ind.	.15½	.14
Indianapolis, Ind.	.15½	.14
Kalamazoo, Mich.	.16½	.15½
Lafayette, Ind.	.14½	.13½
Logansport, Ind.	.15	.14
Michigan City, Ind.	.15½	.14
Muncie, Ind.	.16	.14½
Owosso, Mich.	.18½	.17
Peru, Ind.	.15½	.14
Port Huron, Mich.	.19½	.18
St. Clair, Mich.	.19½	.18
Sandusky, O.	.18	.17
South Bend, Ind.	.15½	.14½
Terre Haute, Ind.	.14	.13
Toledo, O.	.17	.16
Wabash, Ind.	.15	.14
Wauseon, O.	.17	.15½
Wolcottville, Ind.	.16½	.15
Youngstown, O.	.20	.18½

SOUTHERN FREIGHT ASSN.

Crushed Stone

At the suggestion of the carriers, shipper at Siam, Tenn., is asking for rates on crushed stone, c.l. min. wt. Note 1, to N. & W. stations, Radford Division, Bristol District and Abingdon Branch based on I. C. C. Docket 15,216 (Buckland), joint line scale. Docket No. 53,422.

Feldspar

Shippers at Erwin, Tenn., and points in North Carolina are asking for through commodity rates on feldspar, c.l. min. wt. 50,000 lb., in four dockets, as follows: Column (1), to Jackson, Miss., in Docket No. 53,407; column (2), to Birmingham, N. J., in Docket No. 53,408; column (3), to Momence, Peoria and Streator, Ill., in Docket No. 53,434; and column (4), to Lansdale and Hatboro, Pa., in Docket No. 53,-458. Rates are per net ton.

From	(1)	(2)	(3)	(4)
Erwin, Tenn.	$4.63	$5.81	$6.57	$5.00
Toecane, N. C.	4.75	5.81	6.69	5.00
Minpro, N. C.	4.75	5.81	6.69	5.00
Spruce Pine, N. C.	4.75	5.81	6.69	5.00
Cane Branch, N. C.	4.99	6.17	6.93	5.36
Bowditch, N. C.	4.99	6.17	6.93	5.36

Sand and Gravel

Rates on sand and gravel from Elizabethton, Tenn., c.l. min. wt. Note 1, to N. & W. stations, Radford Division, Bristol District and Abingdon Branch, have been asked for by shipper. At the suggestion of the carriers the proposed rates are based on I. C. C. Docket 15,216 (Buckland) joint line scale. Docket No. 53,423.

Soapstone and Talc

Joint through rates are proposed by shippers on soapstone and talc from Birmingham, Ala., on c.l. min. wt. of 50,000 lb. Rates suggested by carriers are, per net ton, to Pittsburgh, Pa., $6.90; to Sayre, Pa., and Rochester, N. Y., $8.66; to Toledo, Ohio, $6.50, and to Chicago, Ill., $6.00. Dockets Nos. 53,424 and 53,425.

WESTERN TRUNK LINE

Cement

A rate of 24 cents per 100 lb., on cement from Superior, Neb., to Laramie, Wyo., is proposed by shipper. The present rate is 30½ cents. Sup. 1 to Docket No. 6,819-A.

Sand and Gravel

A reduction in the rate on sand and gravel, c.l. min. wt. 90 per cent of marked capacity of car but not less than 40,000 lb., from LaGrange, Mo., to New Boston and Argyle, Iowa, is sought by shipper. The present rate is $2.20 per net ton and the proposed rate $1.05 per net ton. Docket No. 4,990-C.

SOUTHWESTERN BUREAU

Cement

Shippers are asking the carriers to establish the I. C. C. Docket 8,182 scale 3 rates on cement (hydraulic, natural or portland), straight or mixed carloads, min. wt. 50,000 lb., except when marked capacity of car is less, actual weight but not less than 40,000 lb. will apply, from Brookport and Cairo, Ill., to points in Arkansas and Missouri (south of the Missouri River). Interested shippers advise they are figuring on shipping cement to Brookport and Cairo via water, there store it, and ship therefrom by rail. At present rates are published on this basis from Kosmosdale, Ky., Marquette, Mo., and Alabama producing points to Arkansas in S. W. L. Tariff 168-A and were recently authorized to Missouri points south of Missouri River, also Eastern Kansas. Docket No. 21,974.

BUILDING MATERIAL PRICES, DECEMBER 1, 1930

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S. Bureau of Standards.

City	Portland Cement (*bbl.*)	Gypsum Plaster (*tons*)	Gypsum Plaster Board (*1,000 sq. ft.*)	Lime (*tons*)	Building Sand (*cu. yd.*)	Crushed Stone (*tons*)	Roofing Slate (*100 sq. ft.*)
Akron, O.	$2.67	.....	.....	$18.00	$1.85	$1.85	.....
Albany, N. Y.	2.97	$17.10	$24.75	18.00	.....	.....	.....
Atlanta, Ga.	2.85	18.00	.....	17.50	3.38	3.25	.....
Baltimore, Md.	2.54	16.00	.....	13.00	2.50	2.75	$10.00
Birmingham, Ala.	3.00	17.00	.....	19.00	2.85	2.25	.....
Buffalo, N. Y.	2.95	16.00	21.00	18.00	2.50	2.05	12.00
Chicago, Ill.	2.25	16.00	21.00	17.00	2.00	2.00	.....
Cincinnati, O.	2.95	.....	24.75	16.40	2.63	2.55	.....
Cleveland, O.	2.40	14.50	22.00	12.00	1.95	2.70	16.00
Columbia, S. C.	2.63	14.15	.....	13.50	2.50	2.75	11.00
Columbus, O.	2.70	15.00	.....	14.00	.....	2.25	11.00
Denver, Colo.	3.20	18.00	32.00	22.00	1.25	1.50	.....
Des Moines, Iowa	3.08	.....	.....	20.00	1.10	.....	.....
Detroit, Mich.	2.60	17.60	25.00	14.80	2.23	3.00	.....
Erie, Pa.	2.40	16.00	22.50	19.00	2.25	.....	.....
Fairmont, W. Va.	2.80	18.00	35.00	16.00	3.15	3.50	13.00
Grand Forks, N. D.	2.80	16.00	25.00	.....	2.60	.....	.....
Kansas City, Mo.	2.50	15.00	25.00	24.00	1.70	1.80	17.00
Lansing, Mich.	2.90	16.50	.....	14.00	.....	.....	.....
Los Angeles, Cal.	2.30	15.20	.....	22.00	1.85	1.90	.....
Louisville, Ky.	2.52	16.00	.....	15.50	2.20	2.43	18.00
Milwaukee, Wis.	2.25	18.00	25.00	16.00	1.50	1.30	14.00
New Bedford, Mass.	2.60	17.50	27.00	18.50	1.75	3.00	.....
New Haven, Conn.	2.90	.....	.....	20.00	1.25	2.25	.....
New London, Conn.	2.80	18.00	25.00	26.00	1.50	3.00	.....
Paterson, N. J.	2.40	17.50	25.00	18.00	1.50	2.10	14.00
Philadelphia, Pa.	2.30	18.00	.....	15.00	1.80	2.65	10.00
Portland, Ore.	2.60	18.00	30.00	23.00	1.50	.....	.....
Poughkeepsie, N. Y.	2.18	.....	.....	.....	2.25	2.00	.....
Richmond, Va.	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y.	3.25	17.00	22.00	20.00	1.75	2.40	12.00
Rockford, Ill.	2.90	18.00	25.00	20.00	1.75	1.15	15.75
St. Louis, Mo.	2.15	18.00	.....	18.00	1.35	1.00	13.00
St. Paul, Minn.	2.45	18.00	.....	18.00	2.23	1.75	13.00
Saginaw, Mich.	2.35	17.00	25.00	18.00	2.50	3.25	14.40
San Antonio, Tex.	2.60	19.15	.....	20.00	2.10	2.35	.....
San Francisco, Cal.	2.80	19.90	.....	22.50	1.40	1.60	16.00
Savannah, Ga.	2.25	16.00	25.00	20.00	1.75	.....	.....
Scranton, Pa.	2.80	19.00	.....	20.00	3.25	.....	.....
Seattle, Wash.	1.75	20.00	35.00	22.00	1.40	.....	.....
Shreveport, La.	3.20	22.00	.....	.....	2.00	3.80	15.00
Sioux Falls, Ia.	3.00	15.00	.....	24.00	1.25	2.25	.....
Syracuse, N. Y.	3.00	17.00	22.50	18.00	2.00	2.25	12.00
Tampa, Fla.	3.00	18.75	.....	24.00	2.00	4.50	.....
Terre Haute, Ind.	2.85	20.00	28.00	18.00	1.65	3.50	14.50
Toledo, O.	2.60	14.50	20.00	16.00	2.00	2.50	.....
Trenton, N. J.	2.40	17.50	26.00	18.00	1.50	2.10	14.00
Tucson, Ariz.	3.37	17.10	.....	30.00	1.25	2.25	.....
Washington, D. C.	2.55	16.00	25.00	14.00	.....	.....	.....
Waterbury, Conn.	3.00	18.00	30.00	20.00	1.35	2.45	15.00
Youngstown, O.	2.60	15.00	.....	15.00	3.40	2.50	14.00

Advisory Board Reports

That shippers in the non-metallic minerals industry are interested in the work of the Regional Shippers' Advisory Boards, is proven by list of officers and committees of these boards. Many of the responsible positions on these boards are held by traffic men in this industry. On account of the accuracy of the forecasts of the commodity committees of these boards in the past we are giving here a summary of the actual car loadings for the first quarter of 1930 and the estimated loadings for the first three months of this year. The total actual loadings of all commodities in the United States during the first quarter of 1930 were 6,949,063 cars and the estimated requirements for the corresponding period of this year are 6,568,456 cars or a decrease of 5.5 per cent. No doubt a part of this decrease is due to the increased use of the motor truck and part to the increases in the carload minimum weights of some commodities. Some allowance might also be made for the fact that most of these estimates were furnished during the early part of December and do not reflect the increased optimism which has come with the new year. Reports are only available on those commodities that move in large volume.

CARLOADINGS FOR FIRST QUARTER, 1930, AND ESTIMATE FOR SAME PERIOD, 1931

BOARD	Stone—Sand—Gravel			Cement			Lime and Plaster		
	Actual 1930	Estimate 1931	Estimate Increase (*per cent*)	Actual 1930	Estimate 1931	Estimate Increase (*per cent*)	Actual 1930	Estimate 1931	Estimate Increase (*per cent*)
New England	3,160	2,686	15.0*	1,464	1,508	3.0	2,632	2,211	16.0*
Atlantic States	34,840	28,116	19.3*	26,909	24,218	10.0*	9,227	9,227	.....
Allegheny	34,427	29,607	14.0*	3,995	3,763	5.8*	3,654	3,537	3.2*
Great Lakes	14,745	14,000	5.1*	3,864	4,000	4.0	10,560	10,000	4.0*
Ohio Valley	36,101	28,159	22.0*	7,240	5,966	17.6*	1,634	1,504	8.0*
Mid-West	35,231	29,950	15.0*	8,184	5,471	33.1*	4,273	3,000	29.8*
Northwest	2,404	2,404	.....	1,535	800	47.9*	378	265	30.0*
Trans.-Mo.-Kansas	27,801	27,801	.....	9,402	8,846	5.7*	3,488	2,965	15.0*
Southeast	63,890	76,668	20.0	11,740	11,975	2.0	4,250	4,250	.....
Southwest	54,126	48,713	10.0*	7,913	7,913	.....	2,810	2,810	.....
Central Western	9,682	8,037	17.0*	2,883	3,297	14.4	.....	.....	.....
Pacific Coast	40,776	43,712	7.2	8,164	8,164	.....	.....	.....	.....
Pacific Northwest	2,171	2,212	1.9	441	452	2.5	294	198	32.6*
Totals, All Boards	359,354	342,065	4.8*	95,459	88,678	7.1*	43,200	39	7

*Decrease.

Advantages of Welding Featured at Exposition

The Linde Air Products Co., New York, N. Y., will exhibit at the Mid-Western Engineering and Power Exposition, Chicago, Ill., February 10 to 14.

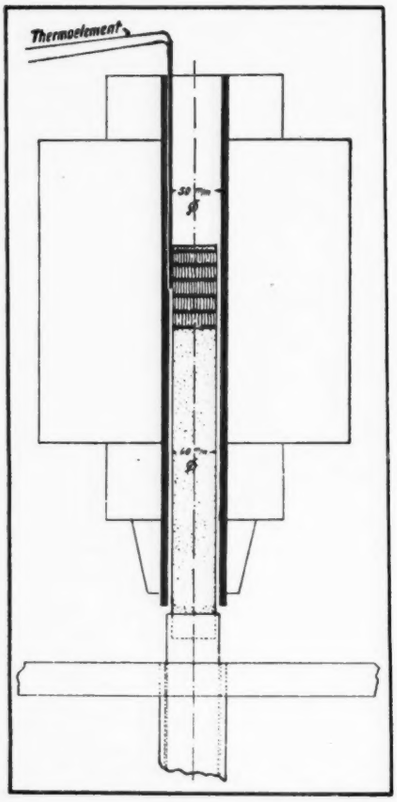
The Linde exhibit will feature the strength and dependability of oxy-acetylene welded joints for power piping and equipment. Typical specimens of oxwelded piping construction will be displayed, together with the newest types of welding apparatus and accessories. H. H. Griffith will be the representative in attendance.

Review of Foreign Practice

Belgian Firm Plans to Work Sandstone Deposit

Practically all the sandstones so far exploited in Belgium lie in the same formation in the Upper Devonian, occurring principally in the valleys of the Ourthe and of the Meuse and in the Theux and Namur basins. The most remarkable deposit of stone in this system is in the valley of the Ourthe near Condroz, where stone is available for a depth of 117 meters on a length of 1,200 meters. The stone is fine-grained, exceptionally regular, and has great compressive strength. Naturally such a source of stone has not gone undeveloped and, for more than a hundred and fifty years, it has been worked to produce paving stones. The accumulated refuse from these operations has, in places, reached enormous proportions.

Recently a company has been formed under the leadership of M. Wautriche of Comblain-au-Pont to operate a large quarry and crushing plant in modern fashion. All suitable stone will be sold for paving blocks, but the waste will be utilized in a crushing-and-screening plant which will produce all sizes of rock for which there is commercial demand. The crushing unit of the plant, capable of handling 80 to 100 tons an hour, will be situated at the edge of the quarry floor and at one side of a state highway. A bridge passing over both the road and the Ourthe river beside it will serve for the transportation of cars of paving blocks, and a belt conveyor on an inclined structure above the bridge will carry the crusher product to the screening plant which is equipped with two large rotary screens and a secondary crusher. This plant is situated along a railroad line by which the products will be shipped out.—*Pierres et Minerais*, Brussels, 2:225-227, November, 1930.



Testing kiln in which specimens were calcined.

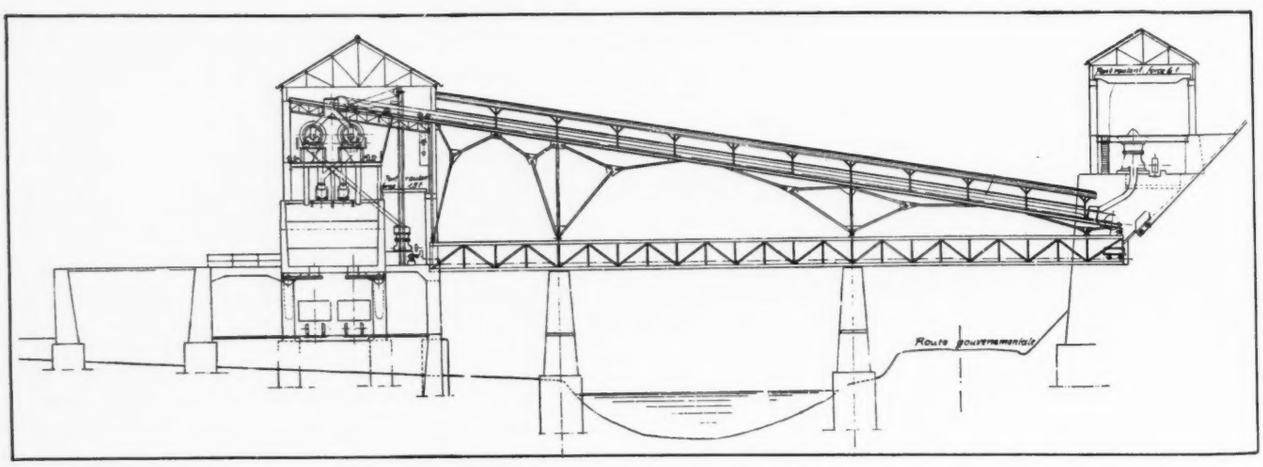
Relation of Free Lime to Constancy of Volume

In an investigation by Dr. G. Haegermann as to the influence of free lime in Portland cement on the constancy of volume (soundness), twelve different raw mixes were burned under identical conditions at different calcining stages from 1,225 to 1,475 deg. C. The materials were, with one exception, raw mixes from actual operation. They were formed into cylindrical specimens of 3.9 cm. diam. and 1.5 cm. high and burned in a special molybdenum resistance kiln. The content of free lime in the ground specimens was determined by the Emley process, and the soundness tested by the boiling test and cold-water test.

The conclusions from an examination of the results, in brief, are that, in the heating conditions prevalent in rotary kilns, a thorough calcination can be achieved at as low as 1,275 deg. The burning stage for thorough calcination fluctuates, on the basis of resistance to the boiling test, for the different raw mixes, by more than 200 deg. and, on the basis of resistance to the cold-water tests, by about 100 deg. C. The boiling test can be withstood with quantities of free lime up to 2 per cent in the clinker and, as far as can be judged from the results, will generally be withstood to 1 per cent. For resistance to the cold-water tests, 4 per cent of free lime in the clinker is given as the upper limit.—Dr. G. Haegermann in *Zement* 19:-984-6, Oct. 16, 1930.

New Magazine Issued by Well Known Wire Maker

A new magazine known as "Wire Engineering" is being distributed by the John A. Roebling's Sons Co. The issues for November and December, 1930, are filled with well-illustrated articles that have direct bearing upon the manufacture and proper use of wire ropes, welding wire, flat wire, copper wire, insulated wire, and cables. The first issue explains that Roebling, through its long experience and research, has accumulated data that will be passed on to its friends. The little magazine may be had upon request sent to the company at Trenton, N. J.



Proposed crushing plant in sandstone quarry in Belgium.

Recent Patents

AMERICAN

Burning

Method of sintering clay (process of manufacturing an aggregate for mortars of concrete). John E. Greenawalt, New York, N. Y. No. 1,786,714.

Cement

High-temperature cement. Addie Hutchinson, Portsmouth, O. No. 1,787,625.

Concrete

Method of manufacturing artificial aggregate for mortars and concretes. John E. Greenawalt, New York, N. Y. No. 1,786,713.

Method of forming and molding concrete. Corwill Jackson, Chicago, Ill. No. 1,787,449.

Crushing

Hammer crusher. George W. Borton, New Lisbon, N. J., assignor to Pennsylvania Crusher Co., New York, N. Y. Nos. 1,786,694 and 1,786,695.

Crushing apparatus. Nils D. Levin, Columbus, assignor to Jeffrey Mfg. Co., same place. No. 1,787,828.

Compartment-tube grinding mill. Joseph V. Durnin, Allentown, Pa. No. 1,787,897.

Driers

Drier for sand and the like. Henry W. Nagel, Alliance, O., assignor to Colonial Iron Works Co., Cleveland, O. No. 1,787,280.

Excavating

Excavating apparatus. Francis H. Hunt, Los Angeles, Calif., and Frederick A. Schroeder, Rochelle Park, N. J., assignors to Raymond Concrete Pile Co., New York, N. Y. No. 1,787,001.

Dipper-tooth. Walter S. McKee, Chicago, Ill., assignor to Kensington Steel Co., same place. No. 1,787,695.

Material Handling

Loading skip. Raymond A. Beckwith, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,787,716.

Miscellaneous

Process and method for dividing intermixed materials. Kenneth Davis, St. Benedict, Pa., assignor to Peale-Davis Co., Wilmington, Del. No. 1,786,738.

Method and mechanism for separating divided materials. Kenneth Davis, St. Benedict, Pa., assignor to Peale-Davis Co., Wilmington, Del. No. 1,786,739.

Method and mechanism for separating intermixed divided materials. Kenneth Davis, St. Benedict, Pa., assignor to Peale-Davis Co., Wilmington, Del. Nos. 1,786,740 and 1,787,340.

Mixing

Stucco mix and process of making the same. Gustave A. New, Port Clinton, O., assignor to American Gypsum Co., same place. No. 1,787,162.

Concrete mixer. Michael Gilson, Fredonia, Wis. No. 1,788,053.

Screening

Vibrating screen. George W. Behnke and Lewis E. Soldan, Durand, Mich., assignors to Simplicity Engineering Co., same place. No. 1,787,852.

Screening device. Luther E. Rice, Aurora, Ind. No. 1,788,124.

FOREIGN

Blasting

Explosive. Herbert G. Tanner. Canadian 307,351.

Cement

Apparatus for burning cement with granulation of the raw material before the burning. Otto Lellep. German 515,172.

Process for protecting Portland cement or Portland-cement mortar or concrete against corrosive waters, for accelerating the set and increasing its hardness. C. Winkler. French 698,422.

Crushing and Grinding

Pulverizing device. G. Wade & Son, Ltd., and G. A. Wade. British 339,414.

Mechanism for regulating the feed in roller grinding mills. O. Moog. British 339,801.

Gyratory crusher. Joseph Elliott Kennedy. Canadian 307,317.

Eccentric for rock crusher. Fried. Krupp Grusonwerk Akt.-Ges. German 515,271.

Single or multiple-chamber mill in which air flows into the grinding space through openings in the mill shell. Adolf Steinbrueckner. German 515,272.

Drilling

Device for rock drills. Etablissements Montabert (Soc. Anon.). French 698,065.

Boring apparatus. Chicago Pneumatic Tool Co. British 339,426.

Blowing device for rock drills. Ingersoll-Rand Co. British 339,703.

Percussive drills and the like and chucks for receiving and driving the same. A. Wheatley. British 339,736.

Hammer drill. Demag Akt.-Ges. German 515,611.

Apparatus for sucking out drill dust. Wilhelm Oberfohren. German 515,612.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Driers

Installation for multiple-stage steam drying. Schmidt'scha Heissdampfgesellschaft m. b. H. German 514,883.

Shaft drier with inbuilt pulverizing device. Bernhard Saegebarth. German 515,443.

Excavating

Excavators. Koehring Company. British 339,282.

Excavating method and apparatus. O. O. App. British 339,656.

Drag scraper. Demag Akt.-Ges. German 514,949.

Mechanical shovel for bulk materials. Bamag-Meguin Akt.-Ges. German 515,091.

Drag scraper. Demag Akt.-Ges. German 515,380.

Kilns

Rotary furnaces or driers. F. A. Johnson. British 339,595.

Mechanical kiln. Balz-Ernzroestung G. m. b. H. Canadian 307,368.

Rotary furnace. Alfred Musso and William P. Deppe. Canadian 307,514.

Magnesia

Process for recovering the magnesia-cement-bearing refuse and broken pieces from artificial marble works. Alexander Staege. German 515,519.

Material-Handling

Loading and unloading bridge for boats. F. Van Roie, J. Bogaerts and A. Heylen. French 698,461.

Lifting or elevating device. W. Frost and Harvey Frost & Co., Ltd. British 339,240.

Conveyors. Mavor & Coulson, Ltd., and J. B. Mavor. British 339,246.

Conveyors. J. S. Atkinson and Stein & Atkinson, Ltd. British 339,465.

Gripping device for lifting stonework and the like. J. R. Rushforth. British 339,507.

Rope grip for endless rope haulages. J. M. Peart. British 339,522.

Pneumatic conveyor for solid material. William Allen Smith. Canadian 307,115.

Apron-type conveyor. Frank A. Fahrenwald. Canadian 307,528.

Conveyor with screw conveyor built in. Fried. Krupp Akt.-Ges. German 515,021.

Conveying device. Gebrueder Eickhoff. German 514,948.

Shaking trough conveyor with toggle drive. Gebrueder Hinselmann G. m. b. H. German 515,090.

Bin installation for bulk materials. A. T. G. Allgemeine Tarnsportanlagen Ges. m. b. H.

Mixers

Mixing machine. Le Lap, Soc. Anon. French 698,163.

Mixers for road materials and the like. Braham Brown, Ltd., W. E. Braham and F. W. Poynor. British 339,584.

Mixing apparatus. A. B. Smith and C. R. Smith. Canadian 307,054.

Concrete-mixing machine. Koehring Company. (Perry P. Yoke.) Canadian 307,454.

Revolving-plate mixer for clay and sand. C. Keller & Co., G. m. b. H. German 515,370.

Sacking

Construction of apparatus for filling sacks. R. Page. British 339,466.

Multi-ply bags. W. W. Triggs (St. Regis Paper Co.). British 339,621.

Separation and Screening

Effecting continuous discharge of solid matters from centrifugal bowls with unperforated bowl-wall. Aktiebolaget Separator. British 339,566.

Sorting screen. Carl Christian Larsen. Canadian 307,321.

Device for shaking screen. "Miag" Muehlenbau und Industrie Akt.-Ges. German 514,811.

Apparatus for separation of dust from gases from kilns, in which the gas to be cleaned is passed through a moving filtering stratum. Eisen und Stahlwerk Hoesch Akt.-Ges. German 515,188.

Unclassified

Treatment of phosphate rock and the like. Odda Smelteverk Aktieselskapet and E. Johnson. British 339,-340.

Artificial marble. F. Roses-Galceran. British 339,674.

Process for bleaching and purifying of earths, clay, china-clay, quartz, silica, feldspar, bauxite, alumina, baryta, calcium, and strontium sulphate and carbonate, and similar minerals. R. Perdu. British 339,797.

Cement-gun nozzle. Cement Gun Construction Co. (Edw. C. Swann). Canadian 307,155.

Flexible wire rope. Oscar A. Wirkkala. Canadian 307,359.

Process for manufacture of artificial marble. A. Baumann. French 698,466.

Will Display Meters at Midwestern Power Show

The Bailey Meter Co. will have a number of its products on display at the Mid-western Engineering and Power Exposition to be held in the Coliseum, Chicago, from February 10 to 14, inclusive.

Among the special features of the exhibit will be a Bailey control drive cut away to show the action of solenoid—operated clutches, time limits travel limits and other distinctive features. There will be a large display of photographs, diagrammatic layouts and chart records from actual installations of the Bailey meter control at various industrial plants and central stations throughout the country. The booth will be in charge of H. M. Hammond, manager of sales and engineering.

Linde Products Expands Its Service Facilities

Announcement has been made that, effective January 1, those units of Union Carbide & Carbon Corp. whose products are used in the main for oxy-acetylene welding and cutting are marketing their products through The Linde Air Products Co.

Coming Events

Feb. 10-13, 1931, Chicago, Ill. Fifth Midwest Power Engineering Conference. G. E. Pfisterer, secretary, 308 W. Washington St., Chicago.

Feb. 22-28, 1931, Cleveland, O. Congress and exposition under the sponsorship of the American Ceramic Society and in coöperation with the American Refractories Institute, the National Brick Manufacturers' Assn., the Chicago World's Fair Ceramic Assn., the Grinding Wheel Manufacturers' Assn. and the Feldspar Grinders' Institute. All meetings in Cleveland Auditorium. Exhibits in Cleveland, Statler and Hollenden Hotels.

Feb. 24-26, 1931, Milwaukee, Wis. Annual Convention, American Concrete Institute, Schroeder Hotel. Joint sessions with Concrete Masonry Assn. and Wisconsin Concrete Products Assn. Harvey Whipple, secy., 2970 W. Grand Blvd., Detroit, Mich.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

April 13-18, 1931. Cleveland, O. National Industrial Equipment Exposition, in connection with Congress on management, maintenance and materials-handling of A. S. M. E. G. E. Pfisterer, managing director, 308 W. Washington St., Chicago, Ill.

May 4, 1931. New York, N. Y. Thirteenth exposition of Chemical Industries, Grand Central Palace. International Exposition Co., managers, Grand Central Palace, New York.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These, interesting by comparison with practices in vogue today, are printed in this column each issue.*

Fourteen Years Ago

DESTRUCTION of the crushing and screening plant of the Brownell Improvement Co. at its quarry at Thornton, Ill., by fire was described. Seventeen crushers of the 18 in use were destroyed, or rendered unfit for future service. The plant was said to be the largest crushed-stone operation in the United States, its annual output being 1,000,000 tons. Plans were announced by the company to rebuild at once, using reinforced concrete to avoid a repetition of another fire.

Ten Years Ago

THE sixth annual convention of the Indiana Sand & Gravel Assn. was held at Indianapolis. Officers elected included M. A. Neville, Western Indiana Gravel Co., Lafayette—president; G. J. Nattkemper, Summit Sand & Gravel Co., Terre Haute—vice-president; G. V. Miller, Granite Sand & Gravel Co., Indianapolis—secretary. Members of the executive committee were J. P. Coyle, H. C. Huffstetter, H. E. Neal, H. L. McGurk and W. S. Baird.

* * *

Surveys, plans and specifications were completed for the Chattanooga, Tenn., plant of the Signal Mountain Portland Cement Co., the estimated cost being $6,000,000.

Five Years Ago

A NEW record for attendance was set at the annual convention and show of the American Road Builders' Assn. held at the Coliseum, Chicago, with 20,000 persons registered. H. G. Shirley, chief engineer of the Maryland Highway Commission, was elected president for the year 1926, succeeding William H. Connell.

* * *

Henry J. Schweim was appointed chief engineer of The Gypsum Industries, with offices at 844 Rush St., Chicago.

* * *

Announcement was made of the purchase by H. P. Margerum of Trenton, N. J., of the holdings of the Erwin Feldspar Co., Inc., operating feldspar and mica mines in North Carolina.

Takes Movie of Cement Plant's Robot Railway

A moving-picture film illustrating the operation of the automatic railway recently installed at the Trinity Portland Cement Co. plant at Eagle Ford, Tex., has been prepared by the Atlas Car & Manufacturing Co. of Cleveland, O. The film may be borrowed by any producer who may be interested in the Trinity installation. A letter to the Atlas Company will bring particulars.

Legal Information for Operators

Use of Company's Books in Suit Over Material

Considerable controversy has existed from time to time regarding the right of a seller of non-metallic materials to introduce his books or ledgers as evidence in suits against purchasers to prove the sale and delivery of goods.

Generally speaking, in order that a book be admitted in evidence the book must contain the seller's original entries or the first permanent records of the transaction. When the contrary is discoverable upon the face of the books, or is disclosed by testimony, the book must be rejected as relevant evidence. Conversely books of original entry are admissible notwithstanding the fact that the entries therein have been transferred to other books.

Also, it is important to know that if the entries were transcribed from a card, or other memorandum, in which they were first entered for a temporary purpose, the first entry of the charges is regarded as a memorandum preparatory to permanent transactions, and the entry in the regular book of accounts is deemed to be the first and original entry. In other words, if the original record was intended by the seller to be temporary it is not deemed to be the original, and the book on which the memorandum is copied must be presented in Court as evidence of the transaction. Moreover, it is not necessary that the temporary memorandum should be made by the seller himself. It may be made by his employe and afterward entered by the seller in his book of original entries.

Another important point of the law is that when an indebtedness exists upon an open account and thereafter the buyer and seller agree that the account is correct, the seller may sue upon either the original account or upon the account stated. If he sues on the original account the purchaser's agreement regarding correctness of the account only has the effect of an admission because the account stated, as a contract, is waived. However, if the suit is brought on the account stated it is brought on the subsequent agreement, and if the agreement is found to exist, then, in the absence of fraud or mistake, the purchaser is absolutely bound thereby. On the other hand, circumstances may exist under which a seller is not compelled to positively prove the amount of materials sold and delivered to a party being sued. This condition may arise when the purchaser regularly receives monthly statements and does not complain that the same are incorrect.

For instance, in Welch-Sandler Cement Co. v. Mullins, 31 S. W. (2d) 86, it was disclosed that a cement company sold to a construction company thousands of dollars' worth of cement. The cement company sent two tickets with the material to the job. One of the tickets was signed and returned, the other left on the job with the party who received the material, and the other remained in the cement company's office and from that ticket the account was posted to the ledger sheets after it was extended and proved to be correct. The evidence was clearly to the effect that the books were kept in the usual course of business and that the entries were not made until proved to be correct and that the book was a register of the daily transactions of the cement company. These memoranda were copied on the company's books. From time to time monthly statements were mailed to the purchaser. Later when the cement company filed suit to recover the amount due it was contended that introduction of the company's books was not allowable because the entries were taken from tickets not proven to have been correct. However, since it was proved that the purchaser had received the monthly statements without comment, the higher Court held the cement company entitled to a judgment for the amount of its account, saying:

"There was independent proof of the delivery of the cement. Monthly statements were sent to the defendant (purchaser) who did not dispute any of the items shown thereby. . . . He thus admitted not only that the items were delivered but that the charges therefor were correct. . . . We have already pointed out that statements from the book were mailed monthly to the defendant. The evidence further shows that before the suit was instituted a statement of the entire account was made up from the books and furnished to the defendant, and that he did not question its correctness. Under such circumstances the book was admissible to indicate what items of account had been furnished to the defendant. . . ."

Court Holds Lien Valid Despite Error in Fact

In Brown v. Turenage Co., 26 S. W. (2d) 1115, it was shown that a lien claimant filed a lien in which he described more land than was proper. The property owner attempted to invalidate the lien on this plea. However, the Court held the lien valid, saying:

"All that is essential is that the land or the building be designated in such language as will afford information concerning the situation of the property to be charged with the lien. . . . The fact that the claim filed under the statute described more land than is subject to the lien does not defeat the lien . . . where the claim and the account filed with it, duly verified, indicate the improvement, so that it can be identified by persons of ordinary intelligence."

When Employee or Agent Exceeds His Authority

Generally speaking, all persons who transact business with employes are bound to ascertain the extent of their authority. Failure to do so may result in liability of the contracting party although apparently the agent has ample authority to bind his employer. This rule of the law is especially applicable with respect to salesmen and sales agents.

For example, in Barber-Greene Co. v. Proksch, 232 N. W. 232, it was shown that a contractor entered into a contract or lease for a concrete spreading machine.

The lease provided that either party might cancel at the end of five months after the date of the delivery of the machinery and equipment, irrespective of whether the contractor's contract for the construction of a concrete highway was completed or not. The contractor did not cancel the lease but he went to the sales agent with whom he had all his dealings in regard to the purchase of the machinery. The testimony shows that the sales agent agreed, on behalf of the manufacturer, that if the contractor would return all of the machinery without putting the manufacturer to the expense of repossession and loading the machinery, the latter would release him from all further liability under the contract and lease. The contractor returned the mixer, but the manufacturer sued to recover the rental on the same, amounting to $600 a month on the contention that the sales agent exceeded his authority when he informed the contractor that he would be relieved from further liability for payment of the rental if he returned the mixer. It is interesting to observe that the higher Court held the manufacturer entitled to recover the rental, saying:

"It was defendant's (contractor's) obligation to pay the rent in accordance with the agreement. It further was his duty to return the property at the end of the term and to pay the rent that was due up to that time. . . . It is true that a selling agent would not have the authority to release a debtor from liability upon return of the goods sold unless there were proof of a ratification by the seller."

Insurance Problems Discussed

Family-Income Insurance

Is it advisable that a son succeed to the ownership of his father's business? Is it just "handing a lucky boy a soft berth" or is it preserving for the founder's family the fruits of a lifetime of work and organization? Sometimes it is the first case, and sometimes the second. Sons differ, fathers differ, and so do business conditions.

This matter of a son growing up to take over the management of the business his father founded is a deep social problem. There are several definite objections to it. In the first place it may be unfair to some older employees. How would you feel if you had worked for years for the same employer, mastering the business to a point where you could run it yourself, and then the "old man" pushed his son right over your head? Such action is a strain on business loyalty because you sap the ambition of your best men if you cut off open competition for promotion. From the standpoint of the son himself one must also consider whether he is fitted for the business and whether having his job guaranteed will make him lazy.

Advantages to Family

The advantages of turning a business over to a son, however, are generally greater than the objections. Whenever a good business has a change in policy of management there is a loss of profits. Continuity promotes efficiency. Too, the founder's family is able to enjoy the full return for his years of organization. We might summarize and say that it is usually a good thing for a son to carry on his father's business unless the son himself is unsuited to the work or liable to loaf on the job.

The interest of this department in the question of fathers and sons in business lies wholly in its effect on life insurance. How many times an agent has been turned down when he approached the father who has founded, developed and incorporated his business. The case seems so simple. He has already passed on to his son a part ownership, he has trained him to take over the management, and on the death of father and mother the son will inherit the rest of the ownership.

Liquidation Solved

Such a father seems to be one of the few who has solved the question of what will happen to his business after his death. Probably the old forms of life-insurance contract are poorly adapted for a business of this sort. But a new policy—the family-income policy—entirely different in principle from the old forms, has come on the market in the past few months and serves the family-owned business so well that it is worth a study.

It has always been the plan of this department to discuss only the insurance problems of business, feeling that family and personal questions hardly belong in a business magazine. With that in view we take up the new family-income policy because it has definite business uses. But as you read the following paragraphs you will realize that the new contract covers the entire estate needs of the middle-class married man.

The family-income policy was devised because of the incompleteness of the old standard forms. Heretofore most life insurance has been made payable in a lump sum immediately on the insured's death. This exposes the insurance to all the risks of unwise or speculative investments and much of it is lost.

New Policy Form

It is obvious, however that life insurance is needed, not to provide a big sum of cash, but to carry through the following obligations: (1) Liquidate the insured's own last bills, (2) pay a monthly income to the children until their education is completed, (3) pay a monthly income to the wife for the balance of her life, and (4) be converted to a pension or annuity if the insured lives to the age of retirement.

In the case of a $10,000 policy, the premium rate for which averages twenty per cent more than for simple ordinary life, the following proceeds would be paid to the beneficiaries after the death of the insured: $1,500 in cash at once to liquidate the insured's estate; $100 monthly income to the family until the time the insured would have been 65 had he lived; $10,000 final cash settlement or a further monthly income thereafter.

You will notice that if the insured should die at thirty-five, his family would receive total benefits of between $40,000 and $50,000 on a policy that is nominally only for $10,000. The above contract, or one quite similar to it, is now being sold by one-fourth of all the insurance companies of the country, and is rapidly becoming the outstanding policy form.

Coming back to the family-owned business, where the father designates his son to be his successor. This arrangement eliminates the need for life insurance to cover the sale or liquidation of the business, because the ownership and management are still in the family.

Value of Experience

However, there remains a problem not solved by the son's succession. That is the replacement value of the father's life. Profits depend on experience and brains. Even though his heirs have as much intelligence as he has, they certainly lack his years of experience. The taking away of this experience by death is a distinct loss to the business and will inevitably mean reduced profits until the sons have acquired equal skill and experience in management.

From a strictly economic point of view this replacement of experience value is a steadily diminishing value. The longer the father lives and the longer his heirs are active in the management of the business, the more readily they will be able to replace him. The ordinary-life policy, which is the form most often used for business purposes, is not technically ideal because the amount of insurance is the same year after year. If the father should die at fifty, leaving the business to sons hardly beyond their apprenticeship, the loss would be greater than if the father should die at sixty-five after his sons have had experience in management. The amount of insurance should be reduced as the father's term of leadership expires.

The new family-income policy just fits this situation. By means of the income it provides, the father can guarantee to his business a money substitute for his experience. With this income the heirs can, if necessary, employ competent outside management until they acquire enough experience to carry on the business successfully. Or they can be satisfied with a reduction of operating profits for a few years because the monthly proceeds of the insurance will give them a substitute for the reduced income.

Closed Corporation

The new family-income policy is also well adapted to the needs of a closed corporation. When two or three men both own and actively manage a business, they want life insurance to liquidate the firm on the death of any one, that is, to buy out the deceased's estate and hand the business over outright to the survivors. Now the family of the deceased partner do not want or need a big cash payment for their stock. What they need is a guaranteed monthly income for life. The new family-income policy gives it to them.

Concrete Products Firm to Rebuild Burned Plant

The Media Concrete Products Co. of Media, Pa., has announced plans for the rebuilding of a portion of its plant recently destroyed by fire, with a loss of over $50,000, including equipment.

New Machinery and Supplies

Accuracy Within Close Limits on Weigh Hopper

A new dial-scale weigh hopper that will weigh within four-tenths of one per cent of absolute accuracy, even while the bucket loader on which it is mounted is operating at an angle of 40 deg., has been released by the Barber-Greene Co. of Aurora, Ill. It is used with the newly announced Model 62 Super bucket loader, a crawler-mounted, self-feeding, one-man operated machine with a capacity of 62 cu. ft. per min.

The weighing unit built into this hopper is an American Kron scale. The dial on the scale is graduated into two-pound units and is provided with two markers which may be set to indicate the desired reading. Directly above the weigh hopper is a small auxiliary hopper holding approximately 360 lb. of material. At the top of the weigh hopper itself is a sliding horizontal gate controlled from the operator's platform by a chain. When the indicator hand on

Bucket loader with weighing unit in use.

the scale dial is near the desired weight reading, the sliding horizontal gate is closed, allowing the auxiliary hopper to fill. By working the sliding gate with the chain, the material is allowed to feed from the auxiliary hopper into the weigh hopper until the required batch is present.

The weigh hopper will weigh batches up to 3600 lb. not to exceed 32 cu. ft. in volume. In actual operation at Brockton, Mass., the loader and weigh hopper were able to load trucks consistently at a rate of three 1,100-lb. batches in 50 seconds, the operator in each case coming within 3 pounds of exact weight.

The new Barber-Greene Model 62 Super bucket loader has all the standard features of any Barber-Greene loader with some new features of its own. It has, in addition to the standard overload-release sprocket for protection to the machine against strains due to an overload on the bucket line, an overload-release sprocket to protect the crawler drive. It feeds itself by means of two 42-in. disks that lie flat on the ground and revolve inward, crowding the material into the buckets. An adjustable scraper directly behind the feeding disks clears a path 7 ft. 6 in. wide, the overall width of the machine.

Anyone desiring further information on this new accurate batching machine may receive it by corresponding with the manufacturer.

Bin Agitator Speeds Up Cold-Weather Delivery

Stephens-Adamson Mfg. Co. of Aurora, Ill., recently designed an unusual type of agitator for use in the bottom of delivery bins to prevent bridging of frozen material above the discharge gate or feeder.

During the winter months the outside stock piles are likely to crust over with a layer of frozen sand or gravel. The reclaiming shovel has no particular difficulty in loading the material into cars, but when it is loaded into overhead bins for truck delivery the frozen lumps and crusts are likely to arch over the discharge gate and require considerable poking.

The illustrations show the arrangement of the Stephens-Adamson agitator that is used to keep the opening clear. A number of cast steel breakers or paddles are bolted to two square shafts. These shafts rotate in opposite directions and the breakers intermesh to crush any lumps that may hang up the flow of material.

The two shafts operate at 40 r.p.m., requiring 5 to 7½ hp. The device speeds up delivery and is economical as it is operated only when material is being drawn from the bin during freezing weather.

It is not necessary to remove the entire outfit during the summer months. The breaker castings are

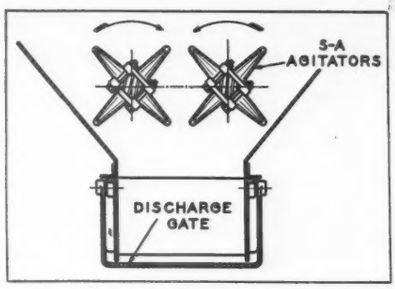


Diagram of action of bin-agitator paddles.

simply unbolted and removed from the shafts which offer practically no obstruction to the flow of sand and gravel.

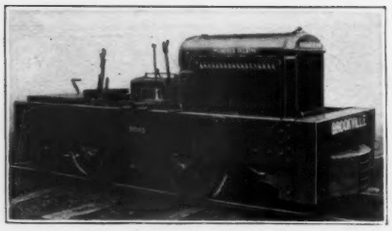
Designs Locomotives in New 8-and 10-Ton Sizes

The Brookville Locomotive Co., Brookville, Pa., recently designed two new models—the 8-ton BMD-8 and the 10-ton BMD-10, each of which is powered by the McCormick-Deering Model 300 industrial power unit, accompanied by a five-speed transmission and a clutch also manufactured by the International Harvester Co. In accordance with the policy followed in designing all Brookville locomotives, these standard units are installed in the chassis without alteration.

As a result of this simple arrangement, the entire power plant and transmission, necessarily the most complicated parts of the locomotive, can be serviced at any International Harvester Co. branch.

The Brookville enclosed-gear reverse used in these models makes all five speeds of the standard International Harvester transmission available in either direction, providing an unusual number of speeds for an industrial locomotive and, in turn, unusual performance. Speeds from 2 up to 16 miles per hour are available for saving time on the run and the gears can be shifted while the load is under momentum.

Close-up view of the power-driven bin agitator.



Mine-type locomotive without cab.

For maximum traction the use of Brookville renewable steel tires is recommended. The manufacturer claims these steel tires provide 25 per cent greater traction and, consequently, 25 per cent greater pulling power than do ordinary chilled-face drive wheels.

Similar to other Brookville locomotives, the BMD-8 and BMD-10 are equipped with dual-spring journals and wide wheel faces, in order to facilitate use upon rough and crooked tracks.

These new models add to the Brookville series of BMD type locomotives, formerly offered in only 4-, 5- and 6-ton models. In fact, it was the excellent performance of these 4-, 5- and 6-ton models that influenced the company to develop the BMD type in 8- and 10-ton sizes.

The BMD-8 and BMD-10 are available in any gauge from 22-in. to 56½-in., or wider; and equipped with either four-pocket link-and-pin type couplers or with MCB couplers for use with standard freight cars. Wheelbase, overall height and other dimensions are variable, within limits, to suit requirements.

Displays New Gasoline Engine at Road Exhibit

The Waukesha Motor Co. celebrated its twenty-fifth anniversary at the recent road show. In a setting of unusual design, the company exhibited a new six-cylinder engine of 300-hp. to 325-hp. capacity. Such an engine, direct-coupled to a 250-kilowatt generator, can furnish sufficient power to operate a large assortment of hoists, pumps, compressors, mixers, elevators and similar equipment, or for marine dredge work in single or multiple units.

The engines are of overhead-valve design with replaceable sleeve-type cylinders and controlled-turburlence combustion chambers. The model on display was equipped with gasoline carburetors.

Another feature of the exhibit was the Waukesha 90 hp. to 100 hp. Diesel engine displayed as a portable power unit, but built also for installation in excavators and all kinds of industrial machinery generally. The outstanding feature of this engine, from the operators' standpoint, is its interchangeability in mounting and power take-off with the standard Waukesha industrial engines of the same size with which the trade has long been familiar. The engine is said to be unusually easy to start by a special system of manifolding and controls in connection with a small gasoline starting carburetor. On the Diesel cycle, a Robert Bosch fuel injection system is employed to handle the .25-.38 gravity fuel.

Besides these two larger units, a six-cylinder industrial unit of a new type made its bow at this show. This unit is built in sizes from 20 hp. to 50 hp. in both fours and sixes.

The new 6-cylinder power unit.

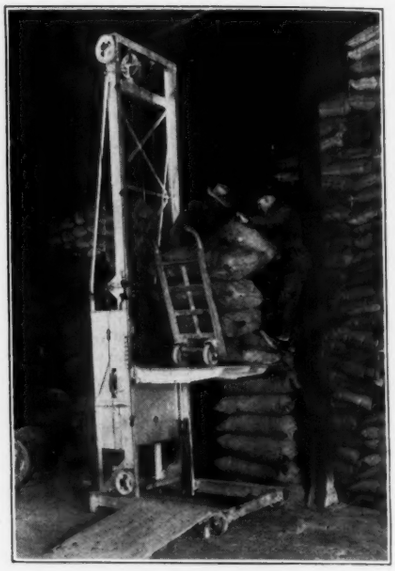
Lifting Machines Have Ball-Bearing Equipment

The Economy Engineering Co., Chicago, announces an entirely new line of ball-bearing-equipped lifting machines. Both hand-and-power-operated, plain and telescoping machines are included in the new development, the machine shown being an electric telescoper of the new type.

Ball-bearings, in these new models, are used throughout the gearing and in the sheave and platform frame wheels. On the "telescopers" the sliding-frame wheels are also so equipped. Friction is further reduced through recently designed flangeless guide wheels which are used to support the platform and telescoping frames.

An actual 25 per cent increase in efficiency is the result of the introduction of these two features. In the new hand power type only 25 pounds cranking pressure is required to lift the rated load. In the 1931 electric models, however, the greater efficiency has been used to provide a proportionately faster travel of platform.

Spur-geared hoisting units are used exclusively, that of the hand power being fully guarded and lubricated with grease. The electric unit is contained in a metal case and runs in a bath of oil. The former has a self-acting gravity brake while the latter has a dual system, both brakes working automatically to hold the load



Lifting machine loading sacked material.

wherever desired and prevent falling of platform in case of current failure.

The electric machines are equipped with high torque motors of ½, 1, 2, 3 horsepower or more, depending on the speed of operation needed. All are controlled alike, unless otherwise specified, by means of a single lever drum switch. A lever attached to the rear of the controller shaft operates the service brake, insuring prompt application at all times.

Automatic limit stops prevent overtravel of platform by returning control lever to "stop" position, thereby stopping motor and setting brake.

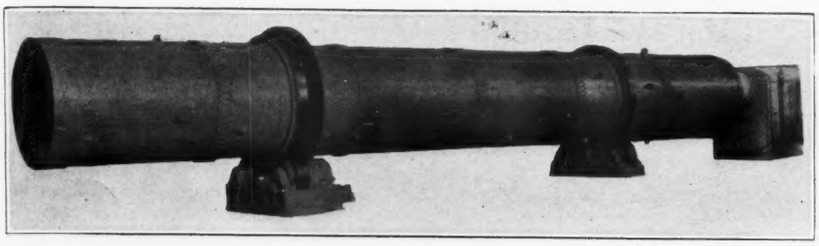
Alemite lubricating system is used on the guide, sheave, and base wheels, as well as on the hand-power hoisting unit.

New Rotary Driers and Kilns are Introduced

The Struthers-Wells Co. of Warren, Pa., has just announced a new line of Timken-equipped rotary driers and kilns. This line includes all sizes from 2 ft. 6 in. to 10 ft. 7 in. diameter and lengths from 20 to 200 ft. or more, as conditions demand.

These units are suitable for use in cement mills, crushed-stone, sand-and-gravel plants, or any industrial plant requiring the drying and the calcining of granular material in bulk. They may be supplied for pulverized-coal, gas, or oil firing.

The construction is quite simple. The shell consists of heavy plate sections riveted or welded together and



The new riveted-shell rotary drier.

substantially butt-strapped to prevent warping or distortion under load or changes in temperature.

The kilns are equipped with lining of refractory material and frequently a shell is provided with both a lined and an unlined section, so that a drying and a calcining operation can be performed in the same shell.

The weight of the shell is carried on two tires or riding rings of rolled steel, the 7-ft. size having an 8-in. face. The tires are mounted so that the expansion of the shell will not affect their relation with the trunnion rollers. Two trunnion rollers, each of 28-in. diameter and 9-ft. face, are provided for each tire. The rollers are mounted on a common base of heavy cast semi-steel. Each roller is mounted on a dead shaft, carried in pedestals, the Timken bearings being mounted in the roller hub. The bearing mounting is designed to hold the rollers rigidly in alignment, so as to reduce wear on both the roller tread and the tire. The pedestals can be adjusted in four directions quite easily to compensate for any inaccuracies in leveling of the base foundations during installation. Individual adjustment is provided for each pedestal.

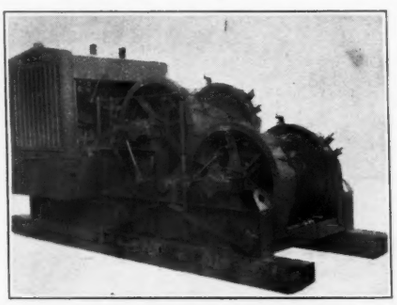
The 40-ft. kilns are driven by 15-hp. variable-speed, wound-rotor induction motors, through a Timken-equipped Farrel-Sykes herringbone-gear reduction unit. The driving pinion of the gear reduction unit meshes with a large ring gear on the shell. The arrangement gives a total speed reduction ratio of 50 to 1, resulting in a maximum kiln speed of 4 r.p.m. What may be called the normal kiln speed is about 2 r.p.m. It is possibly a matter of interest that records on one kiln after installation showed a demand of only 3 hp. at 2 r.p.m. owing to the thorough anti-frictionization of all rotating parts.

Introduces New Design in Band Friction Hoists

A new type of band friction hoist, in both one-drum and two-drum models, has recently been introduced by the Clyde Iron Works, Co., Duluth, Minn. Self-energizing, internal-expanding band frictions, which respond to the slightest touch of the operator, are employed. Sensitive foot brakes, hand levers, pawls, and throttle controls are conveniently grouped within reach of the operator from a sitting position.

Air cooling, provided by scientifically designed air pockets inside the brake flanges, prevents heating of the brake bands and frictions. This feature permits greater speed in lowering the load, speeding up the entire operation with minimum wear on the bands.

Roller bearings provide free and easy running drums. Two brake



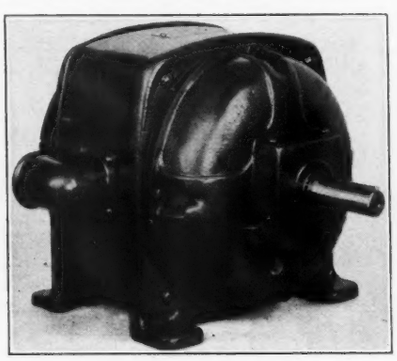
New two-drum band friction hoist.

bands operated on each drum. The bands are interchangeable and embrace approximately 85 per cent of the braking surface. They are extra wide and unaffected by grease or weather conditions.

The illustration shows a gasoline-powered double-drum model. Electric-driven models may also be obtained if desired.

Offers Small Reversing Motors in Low Ratings

The General Electric Co. announces a new line of single-phase, repulsion induction motors, designated type SCA, capable of frequent reversal. These motors have the same appearance as the General Electric type SCR general-purpose, single-phase motors, and are mechanically interchangeable



General purpose reversing motor.

in all respects with corresponding horsepower and speed ratings.

Available ratings range from ¾ to 5 horsepower at 1,800 r.p.m., and from ½ to 2 horsepower at 1,200 r.p.m. All mechanical modifications which may be applied to the general-purpose SCR motors are equally applicable to the new type SCA. The starting torque is high and ranges from 225 to 275 per cent of normal full-load running torque depending on the rating.

Mortar Colors Marketed in Sift-Proof Packages

The Reardon Co., Cincinnati, O., has announced the marketing of a line of concentrated mortar colors. These colors, which come in a sift-proof package, are especially designed to control the mix of the mortar. The manufacturer claims the colors are 99 per cent pure and entirely free from foreign matter and filler.

Two Types of Gasoline Locomotives Introduced

Pursuing the policy that has dominated its business practice for many years, the Mid-West Locomotive Works, Hamilton, O., has refrained from making any announcement concerning its more recent developments in industrial locomotives until every detail of their construction had been proved adequate to meet all demands in actual severe service and thus to assure the mutual satisfaction of the users and the company's engineers.

Two general types of gasoline-powered locomotives are now being offered. One is known as GSD (geared siderod drive), and the other as GCD (geared chain drive). In all essential details aside from these driving mechanisms the two types are identical. They are of rugged construction with a minimum number of the parts that provide the necessary weights for their effective traction specifications.

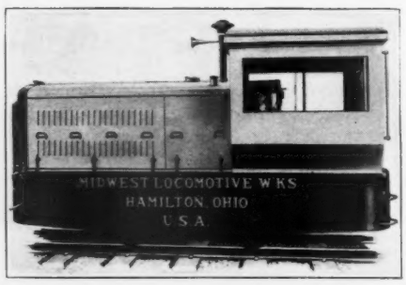
The frame of each machine is a single casting, semi-steel being used in the smaller sizes—up to 12-tons—and steel in the castings for the larger sizes.

The smaller sizes of the GCD locomotives are equipped with a sliding-gear system which provides four speeds in either direction through ordinary shifting. The sizes above 12 tons in weight have jaw-clutch gears with the same range of speeds. The GSD machines, on the other hand, although equipped with the same types of gear systems, have a range of eight speeds both forward and in reverse so that a heavy train can be brought up to speed without undue stresses in the gears. All gears are enclosed within a single case. Shifting is easy, with all sizes, as all shafting, speed-change gears, and bevel reversing gears are carried on Timken roller bearings.

Each machine has long semi-elliptic springs which give the utmost flexibility and permit the higher speeds for which the locomotive is designed. The radiator is of the company's special make, the sectional-core unit being surrounded by a one-piece frame that cannot become dissembled during service.

The clutch is of the multiple-disk type, operated through a central spring. The disks are aluminum-alloy plates with cork inserts which run in oil to reduce heat as well as to assure greater life.

Each engine is guaranteed to deliver the locomotive's rated drawbar pull and is capable of slipping the



A locomotive of the 16-ton type with enclosed cab.

drivers if the locomotive be overloaded. In the smaller sizes, the engines have four cylinders; in the larger sizes, six or eight cylinders.

The locomotives are furnished for track gauges from 24-in. to 56½-in. (standard). They are built with either link-and-pin couplings or one-half, three-quarter or full-size automatic couplers. The cabs may be of the canopy or the fully-enclosed types.

All models are equipped with hand brakes, set between the wheels to impart uniform action on the four wheels. The brake shoes engage both the treads and the flanges of the wheels. The sizes from the 8-ton up may be had with automatic brakes.

The gasoline tank is built into the frame that supports the engine hood and is arranged for convenient filling through the engine hood.

Appoints Representative in Pittsburgh District

Earl C. Bacon, Inc., of New York, manufacturer of the Farrell Bacon crusher and other allied products for the stone industry is pleased to announce the appointment of J. R. Smith, Oliver Bldg., Pittsburgh, Pa., as its representative in that district to handle the surrounding territory.

Bessemer Cement Opens Central Purchase Dept.

The Bessemer Cement Corp., Youngstown, O., has established a central purchasing department at Bessemer, Pa., with K. S. Graham, former purchasing agent of the Peerless Cement Corp., in charge. Both Peerless and Bessemer purchases will be handled by this new department.

Stairway Hazards and Poor Lighting Are February Safety Topics

By W. DEAN KEEFER
National Safety Council

AS topics for the February plant safety meeting, we would suggest a discussion of "Hazards from Stairs and Stairways," and "Safety Value of Good Lighting."

Few persons realize that the largest single cause of industrial accidents—and also home accidents—is due to conditions which result in falls; and a considerable percentage of these falls are on stairs and stairways. It will be remembered that just a year ago, in this series of safety meeting articles, that one of the subjects suggested for discussion was the general topic of "falls." It was stated then that some of the most important causes of falls are:

1. Tripping or stumbling over something.
2. Losing balance and falling from an elevation or into a hole.
3. Slipping.
4. Falling through inability to see.
5. Catching the heel of the shoe.

It will be observed that all of these five causes may relate to stairs and stairways.

When the National Safety Council first began to publish safe practices pamphlets, a number of years ago, the very first one was on "Ladders," and the second one was on "Stairs and Stairways." These two safe practice pamphlets have been revised and reprinted at different times, but the basic facts of these hazards and the basic principles for eliminating them are still valid and comparatively just as important as they were years ago. If desired, free copies of these pamphlets may be secured from the National Safety Council for use in preparation for your safety meeting.

It is suggested that the chairman of the meeting ask the chief of your plant maintenance department to lead in the discussion of the subject of hazards on stairs and stairways. The chairman should confer with the speaker in advance of the meeting so that he may have ample time for preparation. Your maintenance chief should especially emphasize the importance of the proper installation and maintenance of all stairways and the approaches to them. He doubtless will wish to discuss in particular such items as:

1. Treads.
2. Risers.
3. Landings.
4. Hand Rails.
5. Lighting.

During the general discussion all persons in attendance should be invited to express opinions and recommendations on actual changes in plant construction and plant maintenance methods to eliminate the present hazards.

As a follow up, the chairman should appoint a sub-committee, or possibly several sub-committees, to make a careful inspection of the present condition of the plant stairways, from the point of view of a constructive improvement program. These committees should give attention to such matters as:

(a) Approaches.
   1. Is footing safe on floor and landings?
   2. Is light sufficient?

(b) Treads.
   1. Is light sufficient?
   2. Are all lamps in place?
   3. Are treads of proper width?
   4. Do treads afford safe footing?
   5. Are any treads broken?

(c) Risers.
   1. Is the height correct?

(d) Hand Rails.
   1. Are rails smooth, or is there danger of splinters puncturing the hands?
   2. Are rails of proper height?
   3. Are rails of sufficient strength?
   4. Are rails properly placed?

The committees should also give attention to the outside stairs that are unprotected. Outside stairs are naturally closely related to ladders. The topic of "ladders" was suggested for discussion, in this series of articles, for your September safety meeting. But if an inspection of ladders was made at that time, enough time will have elapsed so that a follow-up inspection can profitably be made.

This discussion of outside stairs and ladders is especially important because of winter weather hazards, from the collection of ice and snow and incident to the added hurry and carelessness which is often stimulated by excessive cold or by disagreeable winds or rain.

It is generally realized that the second suggested topic for your safety meetings, on "The Safety Value of Good Lighting," is closely related to the protection of stairs and stairways. Many accidents occur in industrial plants, and also in our homes, as the result of improper or insufficient light.

The chairman of the meeting should ask each member of the plant safety committee to mention any situation where he feels there is a lack of proper illumination. The general discussion should be based on how such situations can best be corrected.

To emphasize the importance of the two topics of the meeting, it would be well, if there is available information, to assemble for the meeting a record of the plant accidents which have been charged to causes which result in falls from stairs and stairways or to poor lighting.

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Gears

Farrel-Sykes Gears. (Farrel-Birmingham Co., Inc., Buffalo, N. Y.) A loose-leaf catalogue describing a wide variety of gears for machines used especially in the pit and quarry industries. Contains several valuable data sheets, technical charts and tables for solving transmission problems.

Hoists

"St. Paul Hoists Aid Omaha Firm in Delivery of Central Mixed and Mixed-in-Transit Concrete." 4 p., 2 ill. (*The Dump Truck on the Job* for January, 1931. St. Paul Hydraulic Hoist Co.) Describes and illustrates the ready-mixed concrete plant of the Ready-Mixed Concrete Co. of Omaha, drawing attention to the hoist-equipped bodies on the delivery trucks.

Lubrication

Industrial Lubrication. 64 p. Illustrated. (Acheson Graphite Corp., Niagara Falls, N. Y.) Describes the complete line of Gredag lubricants according to grade and specifies their use for various industrial machines. Contains also many valuable facts of a practical and engineering nature necessary to those in charge of machinery.

Machinery, Concrete-Products

Besser Concrete Products Machinery and Equipment. 12 p. Illustrated. (Besser Mfg. Co., Alpena, Mich.) Describes and illustrates a complete line of machinery and supplies for the manufacture of concrete products. Two other bulletins, one covering batch mixers, the other the Besser Master tamper, are also available. These describe the two pieces of equipment in more detail.

Machinery, New and Used

Stock List. 4 p. (Mertes Machinery Co., Milwaukee, Wis.) Lists a variety of new and used machinery for pit and quarry plant operators. Included are compressors, pumps, engines, loaders, hoists, and excavating machinery.

Pumps

Murray Pumps. 4 p., 9 ill. (Bulletin No. 106. The Murray Pump & Valve Mfg. Co., New Lexington, O.) Describes and illustrates bronze gathering pumps, roller-bearing center-crank pumps and all-wood valves and fittings for mine and quarry work.

Worthington Power Pumps. 44 p. Illustrated. (Worthington Pump & Machinery Corp., Harrison, N. J.) Describes and illustrates a complete line of vertical and triplex pumps for handling boiler-feed water, mine and quarry pumping and general industrial use.

Scales

There Is Nothing Like the Weightograph! 12 p. Illustrated. (The Howe Scale Co., Rutland, Vt.) Describes and illustrates the outstanding features of an automatic unit for attachment to beam scales, providing quick and accurate weight indication.

Speed Reducers

The HyGrade Data Book. 80 p. Illustrated. (Foote Bros. Gear & Machine Co., Chicago, Ill.) A new data book and catalogue on speed reducers. Discusses evolution of worm-gearing and contains information, tables, curves, and formulae to enable operators to work out their own particular problems.

Testing Machine

Road Building Materials — How Tested? (Tinius Olsen Testing Machine Co., Philadelphia, Pa.) A color broadside which describes and illustrates machinery for testing cement, concrete beams and cylinders, brick, pipe, tile and other materials which go into the making of roads.

Wire Rope

"Attaching Wire Rope Sockets." 4 p., 5 ill. (*Wire Engineering* for December, 1930. John A. Roebling's Sons Co., Trenton, N. J.) Describes and illustrates approved methods of fastening sockets to wire rope.

New Corporations

QUALITY SAND & GRAVEL CO., c/o Tangeman & Walsh, attorneys, Wapakoneta, Ohio. $6,000. E. J. Metzger, Herbert Hirschfield and Elmer Hirschfield.

GARDEN STATE SAND & GRAVEL CO. INC., 63 Morristown Rd., Bernardsville, N. J. $50,000.

BRAHAM GRANITE WORKS, INC., Braham, Minn. $100,000. Gust Larsen, Edwin G. Larsen, Arthur N. Larsen and Philip T. Larsen.

KOMMICK PROCESS BRICK CO., 3970 Lafayette St., St. Louis, Mo. Albert Seelig. To manufacture sand-lime brick.

AMERICAN-ROUMANIAN MICA MINES, INC., Cleveland, O. $100,000. John J. Banatanu, Octavian Ramba, Fred H. Eggers, C. G. Brenner, 512 Society for Savings Bldg., Cleveland, O.

AGRICULTURAL POTASSIUM PHOSPHATE CO., 7 West Tenth St., Wilmington, Del. $90,000. C. S. Peabble, A. V. Lane, H. E. Grantland.

OHIO SHALE PRODUCTS CO., Mansfield, O. $40,000. Ralph E. Race, Philip Furstenberger, attorney; Edward J. Myers and J. L. Laeng, all of Bucyrus, O. To manufacture shale products.

ILLINOIS SILICA SAND CO., 820 Pearl St., Ottawa, Ill. $10,000. Everett W. Weaver, president; Mrs. Frances B. Weaver, secretary; Paul Bechtner, vice-president.

ROBINSON GRAVEL CO., Austin, Tex. Alonzo Robinson, 706 W. 7th St., Austin.

Opens District Offices in Two Mid-West Cities

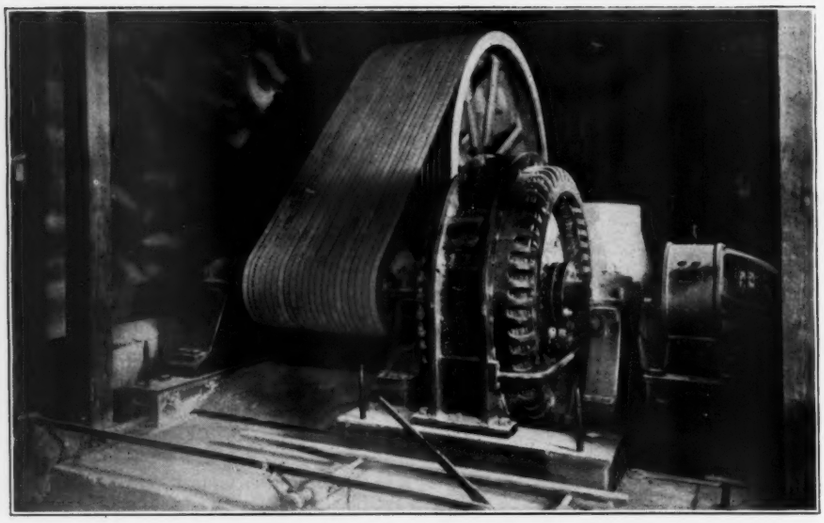
The Pangborn Corp., Hagerstown, Md., announces the opening of district sales offices in Cincinnati and Milwaukee, effective January 1, 1931. An innovation is the appointment of Thomas J. Dougherty as a special sales engineer at the home office to cover the Hagerstown district.

Book Reviews

A Geomagnetic Survey of the Bauxite Region in Central Arkansas, by Noel H. Stearn. Issued as Bulletin 5 by the Arkansas Geological Survey, Little Rock, Ark. This pamphlet reports the findings of a survey by magnetic devices. The project was predicated upon the striking relation between occurrences of syenite masses—which are readily traced by geomagnetic methods—and deposits of bauxite. The field practice is explained, and maps show a high-magnetic field in central Arkansas and the hypothetical boundaries of a bauxite area. A copy may be obtained upon request.

Elements of Engineering Geology, by Heinrich Ries, Ph.D., professor of geology, Cornell University, and Thomas L. Watson, Ph.D., late professor of geology, University of Virginia, John Wiley & Sons, Inc., New York, N. Y. Price $3.75, postpaid.

This is the second edition, the original edition appearing in 1921. The book has been a favorite textbook among engineering students. In its new form it comprises the following chapters: The importance of rock-making minerals; Rocks and their relations to engineering work; Structural features and metamorphism; Rock weathering and soils; Development, work and control of rivers; Underground water; Landslides, land subsidence and their effects; Relation of wave action and shore currents to coasts and harbors; Origin and relation of lakes and swamps to engineering work; Origin, structure and economic importance of glacial deposits; Geology of dams and reservoirs; Road foundations and materials; Ore deposits, and historical geology.



Crusher line-shaft being driven, through cog-belt drive, by 300-hp. synchronous motor.

Synchronous Motors Prove Effective in Solving Severe Drive Problem

IN an effort to improve both plant efficiency and power factor, many rock-crushing plants and cement-mills are replacing engines and, in some cases, induction motors with synchronous motors of practically standard construction.

Whether the motor is used for driving a crushing-plant line shaft or an individual crusher does not make a great deal of difference in its characteristics. In either case it must develop high starting and pull-in torques unless the operator runs all the material out of the machines before stopping the motor and is satisfied to dig the material out if the motor is of necessity shut-down with the machines loaded. It is desirable to have sufficient starting and pull-in torques to meet ordinary starting conditions, but it is not often economical to provide sufficient torque to meet the unusual cases encountered when the motor pulls out of step due to overload, or stops due to power failure with the machine heavily loaded. The motor should have a high pull-out torque to enable it to carry over the peaks occasioned by unusually hard rocks entering the crusher. It should also have sufficient thermal capacity to care for the heat generated in the windings during the accelerating period. The thermal capacity is a problem of design which can be solved satisfactorily only by knowing the weight and approximate dimensions of the moving parts of the driven machines.

The problem of vibration demands consideration and is best solved by using a belt drive for connecting the motor to the shaft of the driven machine. However, in many cases the motor is coupled directly to the power intake shaft by means of a flexible coupling that provides considerable damping effect.

The Westinghouse Electric and Manufacturing Co. has made a number of installations of synchronous motors to drives of the above type. These include two 500-hp., 400-r.p.m. motors driving crushing rolls in an eastern cement plant; 500-hp., 150-r.p.m. and 300-hp., 600-r.p.m. motors driving crushing-plant lineshafts; and a number of 150- to 300-hp. motors driving gyratory, jaw and cone crushers and hammer mills.

A 500-hp. synchronous motor driving a roll crusher through belt.

Government Opens Bids on Boulder Dam Mar. 4.

The United States bureau of reclamation announces that specifications for the Hoover Dam, power plant and incidental projects have been sent out to prospective bidders and that bids will be opened on March 4.

Advertisement of bids for the initial group of small residences at Boulder City is in progress at the present time and plans for the second group, which will include a dormitory, administration building and garage, are in progress.

Eight miles of track have been laid, all culverts and bridges placed for 14 miles and most of the grading, with the exception of a few cuts, on the Union Pacific part of the construction railroad, from Bracken Junction to Boulder City.

Construction power may be made available May 15, instead of June 1, by the Southern Sierras Power Co., if it is able to use the new highway from Boulder City to haul equipment for a substation at the latter place. Tentative location has been completed for the transmission line from the city to the site of the dam.

Wire Rope Publication Describes Power Shovel

Outstanding features of the Michigan power shovel, manufactured by the Michigan Power Shovel Co., of Benton Harbor, Mich., are described and illustrated in a two-page article in the January issue of *The Yellow Strand*, published by the Broderick & Bascom Rope Co. The Michigan shovel is equipped throughout with B & B wire rope manufactured by this company.

Duluth Firm Affiliates With New York Concern

Whitney Brothers Co. of Duluth, Minn., through Gwin A. Whitney, president, announces its affiliation with Merritt-Chapman & Scott Corp. of New York. The company will be known in the future as the Merritt-Chapman & Whitney Corp. and will continue to operate over the entire Great Lakes district as a self-contained unit under the same management.

After a Period of . . .

Shut-down . . GREDAG

REG U. S. PAT OFF

LUBRICANTS

GREDAG is the ideal lubricant for equipment that is being placed in service after a period of shut-down. It removes the danger of scoring from bearings that have been exposed to the weather or that have become stiff from weeks of idleness. It reduces depreciation of gears, chains and cables.

GREDAG *Provides Insured Lubrication*

The very fine particles of *pure*, electric furnace graphite, evenly distributed through the soft grease lubricant, quickly develop a graphite filled bearing surface. This graphitic surface has a lower coefficient of friction than plain metal. Furthermore, it is more readily wet by grease, insuring an adhering film of lubrication that prevents metal to metal contact under the heaviest of bearing pressures.

There is a grade of GREDAG for every class of lubrication service.

For dusty, dirty conditions	***For surfaces exposed to water***
For protected operation	***For operations exposed to weather***
For high temperature service	***For cold weather service***

Write for Literature

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